FOOD INDUSTRIES

manufacturing and processing

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LAURENCE V. BURTON, *Editor*

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Getting Business in Spite of Depression

TRYING TIMES will not be with us indefinitely, nor will their memory remain indelible. This is not the first business depression through which we have lived, to emerge wiser and perhaps chastened, nor is it the last that we expect to see.

. . . . But as we grow older one fact stands out in every depression of which we have personal recollection. It is simply this: novelty sells well when the old does not. By novelty we mean the new article, the new idea, the new machine, the new way of doing things.

. . . . Apparently a period of depression has the virtue, troublesome though it may be, of compelling us to take stock of ourselves and our businesses.

. . . . Alert manufacturers seem to understand the principle of novelty very clearly, for over six months ago FOOD INDUSTRIES was informed by a firm of makers of precision instruments and gages—a firm which has been in business for over a century—that they were swamped with business from all kinds of manufacturers of machinery and equipment. This, they explained, was the first step in revamping and redesigning the tools of industry and, from their own venerable experience, they knew that it was the forerunner of wholly new lines of wares that would sell well.

. . . . About four months ago a caller at this office informed us that his old machines were not selling at all but that sales of wholly new machines were so heavy that their speedy delivery was an acute problem. And, in August, a representative of FOOD INDUSTRIES visited a shop in full production on machines that had been invented only in 1930. Orders were pouring in.

. . . . Fine for the equipment makers! Yes. But how about the food manufacturers? We have seen the readjustment in 1930 just as we saw it in 1920. Ten years ago we saw the advent of the ten cent candy bar, canned grapefruit, home-style pickles, high-speed equipment.

. . . . Today we see tomato juice, fish "steaks," frozen meats, packaged meats, frozen fruits, frozen orange juice, and equipment for maintaining the highest natural quality in foods. At a recent convention, a packer of plum puddings in glass told how he put his puddings in an attractive carton and the demand grew so unexpectedly that his volume was limited only by his ability to get the cartons printed.

. . . . At three of the recent food industry conventions almost every exhibitor had something new to sell and we heard not one single complaint about poor business or lack of orders, from either manufacturers or machinery men—a most remarkable observation. The explanation lies chiefly in novelty—something new. If people will not buy the old lines, give them the things they will buy.

. . . . Why not apply the idea now—today? If the food itself cannot be improved, how about the container, the label, or the carton? Can it be produced more attractively or with higher quality at the same cost? Is the equipment old and wasteful of time or materials? Can the food be sold with less sales cost or wasted effort? The way out is research and more research.

Where Is the Inventor?

MANY OBSTACLES are still ahead of the frozen food group in its effort to serve the public. No obstruction is greater than the lack of adequate freezer cabinets in the retail trade. FOOD INDUSTRIES has emphasized this point before and will continue to do so.

That equipment manufacturers have failed so far to meet the problem is shown by the letter of a large meat packer who writes, "We cannot see any very great future for these products (choice, identifiable, individually wrapped meat cuts) until the different refrigerator manufacturers have put the idea over with the public, and have sold enough of their display cases, so that dealers will be properly equipped to handle these products."

Who will develop a satisfactory cabinet and supply the need? As a designing job, a successful cabinet for frozen foods is probably the most difficult problem in the whole food industry, but a huge market is waiting some one.

Packers Must Find New Sources of Profit

AMONG the economic benefits that followed the introduction of chemical control in the animal industry was the notable utilization of material that formerly was wasted. For many years the meat packer has received less for his dressed meats than he paid for the live animal, an illogical state of affairs that applied chemistry has made possible through the development of a great number of byproducts such as hides, hair, tallow, soap, glue, bone, stock feeds, fertilizer, casings, and biologicals like insulin and adrenalin.

But chemistry has not stopped at the packing house. It has gone on, as all sciences do, so that today there is hardly a byproduct of the meat-packing industry that cannot be replaced by something chemically developed from another source. Chemical progress has made it possible to replace leather by textile fabrics impregnated with organic substances; tallow and fats by vegetable oils; hair by vegetable fibers; glue by casein adhesives; bones and horns by plastics of cellulose, condensation, or casein type; stock feeds by vegetable products; sausage casing by cellulose products; and fertilizers by mineral or synthetic substances.

Of the beef carcass, for example, 20 per cent disappears as shrinkage. Another 10 per cent is deemed valueless by the packers. About 60 per cent is edible, leaving but 10 per cent for inedible byproducts, of which hide is more than half. In the past, the profits of the packers have come from this 10-per-cent fraction, the yield from which has offset losses from the sale of the 60-per-cent edible portion. But the market for the sale of byproducts has now met such effective outside competition that it is fast losing its ability to offset the losses on beef. Speaking generally, similar conditions are found in the packing of other meats, although in the case of swine, with a 20 per cent shrinkage, the utilizable byproducts, both edible and non-edible, amount to no more than 6 per cent of the weight of the carcass.

As long as competition with other foods makes it impossible to sell meats as such for higher prices, new ways must be found that will yield the packer a greater profit. Packaged cuts, preserved by chilling, freezing, or some other method, seem to offer a method of realizing a direct profit on that part of the carcass. But it would be worth while to consider also new and higher-value uses for the incidental products of the meat-packing industry.

To FOOD INDUSTRIES it would appear that three alternatives confront the packing industry: higher values for meats, higher value application of incidental products, or the certainty of greatly impaired earnings. The second alternative holds the greatest promise at present and it can be attained by thorough-going research. Instead of studying better ways of making the incidental products, emphasis should be laid upon the discovery of better ways of utilizing them.

Praise to Whom Praise Is Due

THOSE who listened to their radios on Saturday night, Nov. 8, may have been surprised to hear the President of the United States partake in a radio program celebrating the 61st anniversary of the founding of one of the best known food companies in the world. Philosophically minded listeners must have asked themselves about the significance of Mr. Hoover's participation in the event.

To FOOD INDUSTRIES it is entirely fitting that he should have done so. Few industrial concerns have enjoyed a history of ideal industrial relationship comparable to that of the H. J. Heinz Company. Fewer have grown to great size without the aid of the investment banker whose price nearly always is far too great for the service which he renders. To have grown great, to have achieved reputation, to have resisted the importunities of the financiers, to have possessed a record of industrial peace and unparalleled loyalty, merits the distinction conferred by the President.

Two outstanding features characterize the Heinz company, which are found also in several other highly successful concerns. One of these is enterprise. The other is a board of directors composed of active employees who are eternally on the job. We commend these virtues to others.

A Need for Straight Rods

AN ARTICLE in this issue reminds us that we have never seen a macaroni plant in which the drying rods were straight. Thus the wet goods hang from a bent—or even sway-backed—rod, but are trimmed across the bottom with meticulous care either by using shears along a straight-edge, called a trimming bar, or a mechanically operated knife.

Granting that the immediate purpose of trimming is to prevent long ends from dragging on the floor, the net result is that strands of varying length are produced. Consequently, at the end of the manufacturing process, where the dried goods are sawed into appropriate lengths, the item of waste appears, for goods of a variable length are cut into strands of uniform length. Always short pieces are left over, from a half inch to three inches long. These pieces are No. 1 quality macaroni, but, unless they are sold as broken goods at a substantial discount, such odds and ends must be ground and re-run. Even so, the remanufactured goods must be sold at a lower price, in addition to absorbing the remanufacturing expense, because re-run macaroni has a less desirable color than the original goods. Of reasons for this there are plenty. The sad part is that it is largely on account of bent drying rods.

If the macaroni makers would make an intensive cost

study of this feature they would find plenty of incentive for corrective measures. However, as is usually the case with practices of long standing, it should be approached from an outside viewpoint. The fact that bent rods have been with us always proves nothing except that somehow we have been able to get along with them. However, with the current difficulties of making a profit, something should be done about it.

An ideal solution would be a rod that will not sag and become permanently deformed. The next best suggestion would be to trim the bottoms of the strands in a curve that parallels the curvature of the rods. In other words, a bent trimming bar would be less wasteful than a straight one, if macaroni must dry on bent rods.

Why All the Secrecy?

WHEN the members of an industry take pride in asserting that there are no secrets in its operations, why is it that the principal association of the industry holds all its meetings behind closed doors? The ways of the International Association of Milk Dealers are beyond understanding. Such publicity as that association chooses to release is but a revised program of its meetings.

The right, or even the necessity, of any industrial group to hold executive sessions is conceded. Problems of trade practices are generally best discussed in private, for frequently they are anything but pleasant. But technical sessions of any association ought to be open to the several publications serving the industry. Those responsible for the continuance of this policy should remember the age-old common-sense principle that the world cares little about the things one does until he tries to keep them a secret.

Northern Vegetable Growers Still Have Much to Learn

SPEAKING for the New York market, apparently the closer that spring and summer approach, the poorer is the quality of some of the fresh vegetables. If one prefers fresh peas, for example, to canned peas, he will find that their quality is best in midwinter and that as June comes round the quality available falls off very markedly. Apparently the pea growers of Mexico, California, and Florida know more about the proper shipment of fresh peas than do vegetable growers in the Northern states.

Canners of peas have viewed with alarm the increasing sale of fresh peas on the market at a time when the canned product should show the greatest consumption. In the past, they have also scouted the idea that the out-of-season fresh pea is worthy of gracing anybody's dinner table. It must be admitted that up to a very few years ago their contentions were correct. But with the growth in understanding of the principles of refrigeration that has swept over the country, the Southern growers, particularly those of Mexico and California, have learned how to pack their unshelled peas in cracked ice and keep them in practically perfect condition for many days at a time. Winter competition by the fresh article from the extreme South may be very severe for the pea canner; but local competition from fresh peas grown in the Northern states will never be as large a factor until the use of refrigeration to preserve quality is fully developed.

Knowing how cheap fresh peas are in the months of June and early July, in the northern part of the country, one doubts the economic possibility of successful icing of the fresh garden produce of that region in a very large way. The selling prices are too low to warrant the added expense.

Laurence V. Burton Now Editor Of *Food Industries*

THE publishers take pleasure in announcing the appointment of Dr. Laurence V. Burton as editor of FOOD INDUSTRIES, effective Nov. 1, 1930.

Dr. Burton has been a member of the editorial staff of FOOD INDUSTRIES since its inception, and has contributed materially to the service rendered by this publication to all engaged in the manufacture and distribution of food products. As a background for the exceptional demands of editorial work he has the desirable combination of training and experience. He was graduated as a chemical engineer from the University of Illinois, where he subsequently received his Master's degree in biological chemistry. Further study and research in bacteriology at Yale University earned for him the degree of Doctor of Philosophy. On this foundation he has since built a varied practical experience in the manufacture and processing of food products.

Beginning as foreman and chemist for canning companies in Wisconsin and Illinois, he later entered the laboratory of Libby, McNeill & Libby. In a short time he was made an assistant to the superintendent of the pickle and condiment department. Following war service in the Food and Nutrition Department of the Sanitary Corps he served as director of the inspection service for the National Canners' Association in Illinois, and parts of Kentucky and Wisconsin. Research for the Illinois Canners' Association then claimed his attention for a time, but he returned to the Libby organization in the general superintendent's department in charge of formulas, processes, and technical procedure. At the same time he had charge of operations at Libby's Colorado plants. Later he undertook development work for the Foulds Company, which brought him into the manufacture of macaroni, ice cream cones, and the canning of spaghetti, including the establishment and operation of the company's plant at Franklin, Ind. This was followed by a period of consulting work, in which he was engaged when he joined the staff of FOOD INDUSTRIES.

Dr. Burton's appointment is in accord with established McGraw-Hill policy to base its publishing service on editorial authority and leadership, growing out of a practical understanding of the problems of industry. Hence it is with a deep sense of responsibility to the field of food manufacture, as well as with a feeling of confidence in Dr. Burton, that the publishers announce his appointment.

H. C. PARMELEE, Editorial Director,
McGraw-Hill Publishing Company, Inc.

Modern Methods of

MAKING MACARONI

By S. E. MOUNTAIN
Secretary-Treasurer,
Fontana Food Products Company
South San Francisco, Calif.

MACARONI comes from the Italian *maccare,* meaning to bruise or crush, and doubtless refers to the method of making *semolina,* the raw material of macaroni manufacture. Semolina is the coarsely ground and carefully purified middlings of durum wheat grown extensively in southern Europe, Asia Minor, northern Africa, southern Canada and, in the United States, in the Dakotas and northern Minnesota. Its unique properties were responsible, no doubt, for such a peculiar form of cereal food.

Durum semolina middlings are much richer in gluten and other nitrogenous substances than are similar products of common wheat, and consequently the dough from which macaroni is made is tough, tenacious, and retains its shape while curing and after cooking. Spurious macaroni products, made from ordinary flour, usually are of a grayish-white color, have a higher starch content than semolina products, and cook into an unappetizing, pasty mass. This criticism does not apply to egg noodles, because in them the egg proteins act as a binder and the yolks color the product a pleasing yellow.

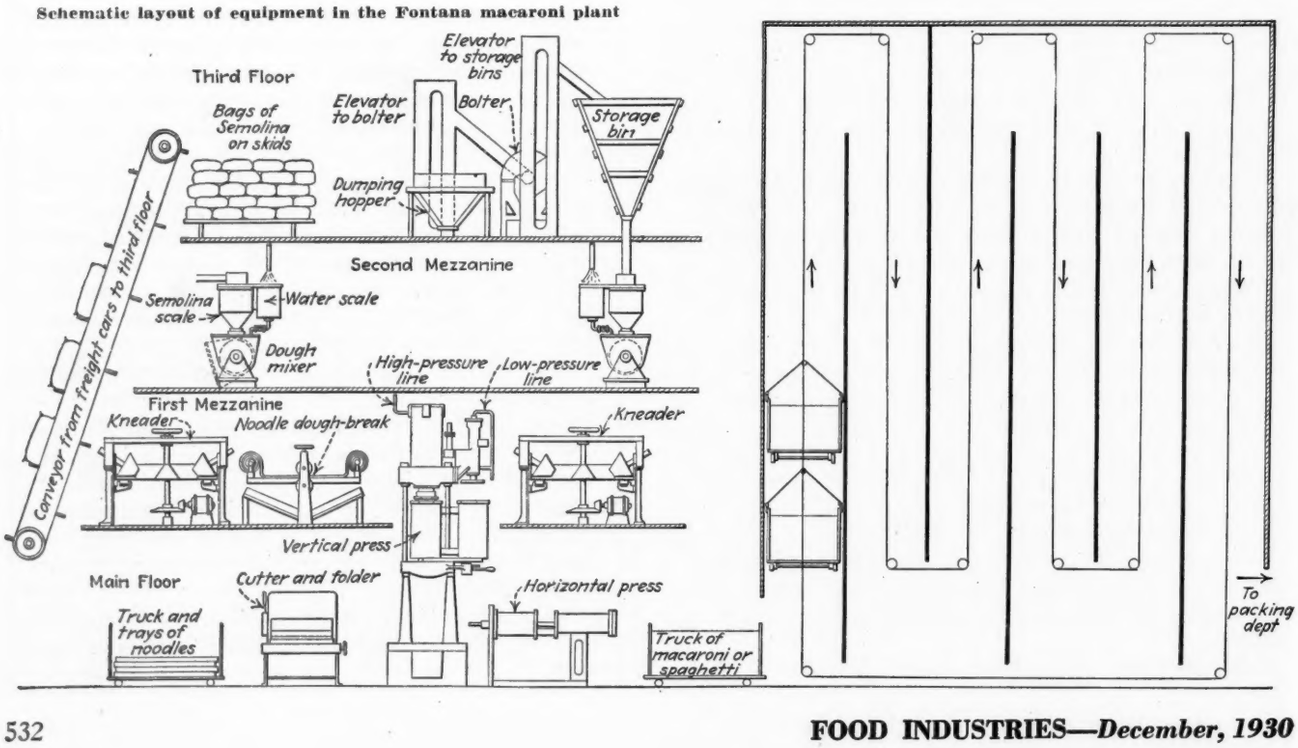
The raw material of paste products could hardly be simpler. It consists of semolina and water with a little salt for the true pastes—macaroni, spaghetti, vermicelli, and their immediate variations—and of semolina or other flour, eggs, and water for noodles. To produce the familiar tubes, sticks, and strips efficiently and economically, however, requires considerable skill as well as much heavy machinery.

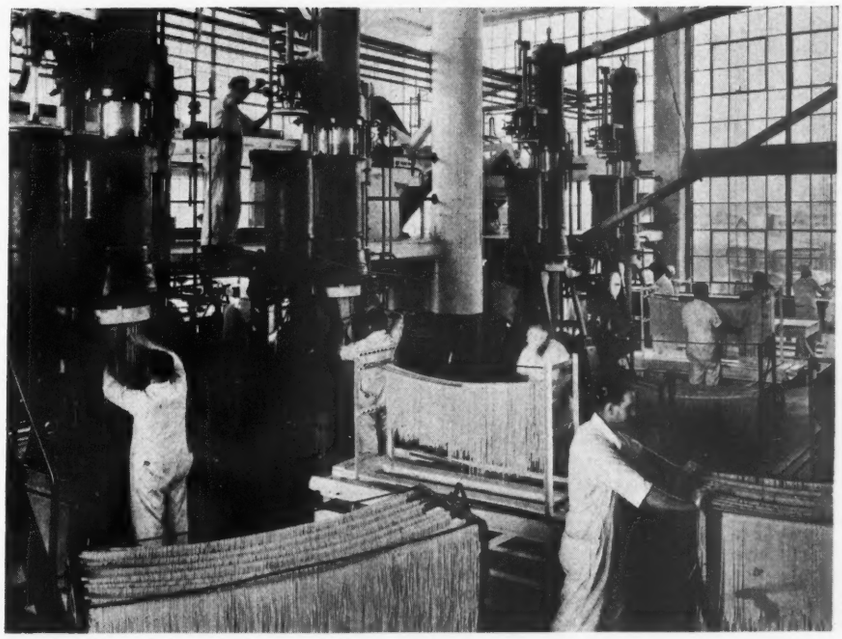
The Fontana Food Products Company, of South San Francisco, Calif., which manufactures 33 varieties of paste products, is a good example of modern methods of macaroni manufacture. It was organized in 1922 with M. E. Fontana as president and L. R. Podesta as vice-president. It was a new company—new in the macaroni business, though Mr. Podesta had had a lifelong training in macaroni manufacture. Since 1922 the Fontana plant has come to be the largest in the West, its business extending over all the Western states and to a moderate degree on the Atlantic Coast.

The factory is a three-story reinforced concrete building, three sides of which consist almost entirely of windows. Adjoining the fourth side is a one-story packing room and warehouse. A separate building houses the boiler, water filter and softener, and hydraulic pumping equipment. The plant is on the main line of the Southern Pacific Railroad and is served by two spur tracks, one at the warehouse and the other at the factory.

An automatically fired boiler using natural gas as fuel

Schematic layout of equipment in the Fontana macaroni plant





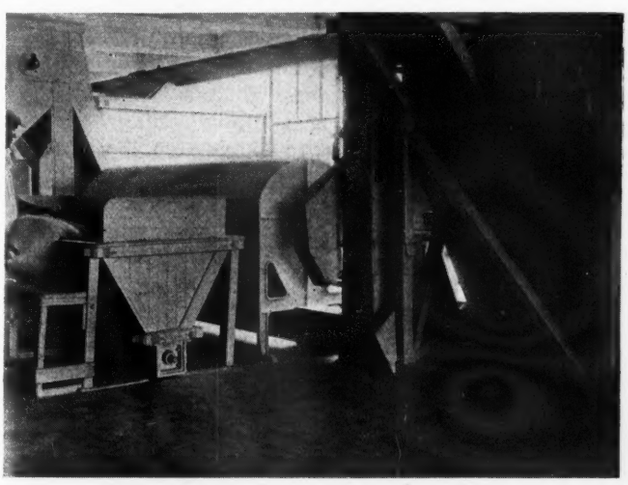
The production of macaroni by pressing is clearly shown in this large, convenient, and well-lighted press-room of the Fontana company

furnishes steam for heating and humidifying the curing rooms. A Permutit water softener insures the quality of the water used. The concrete floors, generous windows, and liberal use of white paint make almost ideal conditions for efficient sanitation and freedom from insect infestation.

The main room of the factory is two stories high and has two mezzanine floors, a narrow one at the west and top of the room carrying the mixing equipment; a wider one below carrying the kneading machinery. The tops of the macaroni presses are accessible from the lower mezzanine floor and the conveyors to the noodle cutters and folders likewise terminate here. On the main floor are the noodle cutters, the discharge ends of the presses, the horizontal presses, and the shakers for short goods.

A partition separates the main room from the curing rooms, which are housed in a large room three stories in height. The curing rooms are against the north wall,

Dumping hopper on third floor. Bolter in background and V-bottom storage bins at right



then comes an open temporary storage space with switches and electrical equipment on the walls. Against the south wall is a portion divided into floors. The first and third floors contain locker rooms. The offices of the company are on the second.

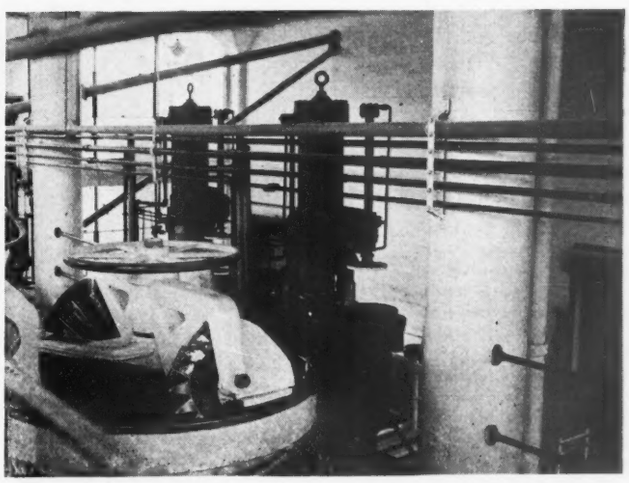
Semolina is received in 100-lb. bags and elevated to a storage room on the third floor by inclined conveyor, then stacked on skid platforms and subsequently moved by lift truck. The semolina is sifted as a precautionary measure, then stored in tin-lined V-bottom bins, arranged in line over the weighing and mixing equipment on the second mezzanine floor underneath. From the bins the semolina flows through the floor into the hopper of a Werner & Pfleiderer automatic scale unit suspended from the ceiling. Each set of scales has a semolina hopper and water tank. Three hundred pounds of semolina is used for each batch.

From the scales the water and semolina drop into an open, self-dumping mixer to be worked into a stiff mass, comparatively dry and crumbly. For noodle dough, the flour and a portion of the water are similarly weighed and mixed, and the egg is added to the flour in the dough mixer after a thorough stirring in a Hobart mixer.

When the dough is properly mixed it is dumped into the kneader located on the first mezzanine floor a few feet below the mixer. The kneader is a large, flat-bottomed, shallow, cast-iron, rotating pan. Two conical corrugated cast-iron rolls, resembling bevel gears, one at each side of the pan, knead the dough as the rotation of the pan passes it under them. The clearance of the rolls, and hence the vigorousness of the kneading, is adjusted by a handwheel. A small adjustable plow turns the dough back into the path of the rolls.

During the kneading operation the mass of semolina and water, which somewhat resembles wet sand with an obviously granular structure when turned out of the

A kneading machine with its corrugated rolls



Greatly enlarged view of a recently introduced pin used in a press die to form the hole in macaroni. This pin is used in making a short, curved product, and the notch, permitting dough to flow faster on one side than the other, is the means used to produce the curve in this design

mixer undergoes a striking change. The grainy structure disappears and the mass is transformed into a stiff, homogeneous, plastic mass, creamy yellow in color and more or less translucent in thin layers. It is strong, and able to withstand the not very gentle treatment given it after pressing and while being transferred from press to curing room.

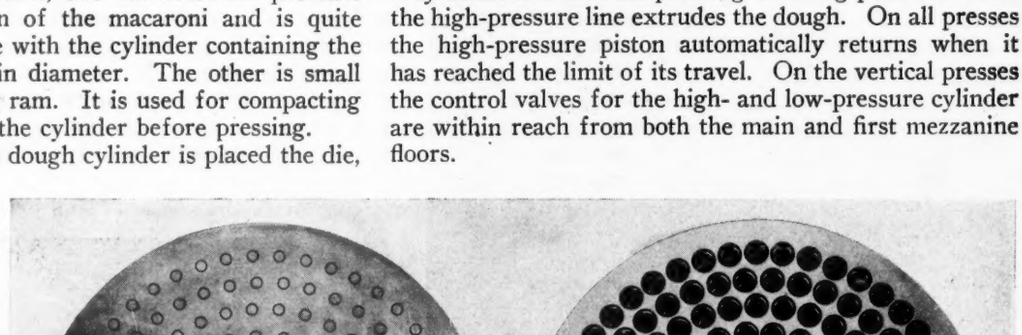
Up to this point the treatment of macaroni and noodle doughs is much the same. With the finished dough the subsequent processes diverge. Macaroni will be described first.

Dough from the kneader is cut up into chunks suitably sized for convenient handling and placed in one of the cylinders of a vertical two-cylinder press. At the Fontana plant these presses are mounted on concrete foundations on the first floor and extend well above the first mezzanine floor. The tops of the dough cylinders are about 3 ft. above the first mezzanine floor. Of the upper hydraulic pressure cylinders, one furnishes the pressure for the actual extrusion of the macaroni and is quite large, comparable in size with the cylinder containing the dough, which is 15 in. in diameter. The other is small and is called the stuffing ram. It is used for compacting the chunks of dough in the cylinder before pressing.

At the bottom of each dough cylinder is placed the die, a perforated bronze plate about an inch thick, which shapes the dough as it is pressed through. How the hole is made in macaroni is the time-worn question asked by nearly all visitors in macaroni plants. The answer is simple. In the middle of each hole in the die is a pin fastened to the body of the die by thin knife-like strips of bronze. These strips split the tube of dough as it passes through, but, under the heavy pressure exerted by the press, the cut edges reunite and the macaroni emerges as a complete tube. Alphabet macaroni is made with dies similarly fashioned. At the Fontana plant spaghetti also is made with a hole through the center, though it is very small and usually disappears during cooking.

With the die in place the cylinder filled with dough is swung into place under the high-pressure cylinder. The piston descends and, forced out by a pressure that may reach 3,500 lb. per square inch, the macaroni emerges from the bottom of the cylinder. When the mass of extruded tubes or rods is about to touch the bottom of the box placed under them on the floor—when they are about 6 ft. long—a workman gathers them up on his left arm and cuts them off close to the press with a knife. He then spreads them out over a wooden rod placed on a special truck, as shown in the illustrations. Having arranged the macaroni so that the pieces do not overlap on the rod, the workman cuts the hanging material to uniform length by stepping on a pedal, placed in the lower middle side of the rack, which operates a knife that shears off the macaroni to lengths of about 3 ft. on either side of the rod. Shorter lengths also may be cut. The cut ends drop into a box below the knife. The wooden pole is now transferred to an angle-iron frame mounted on casters which, when filled, is pushed into the curing rooms.

The hydraulic pumping station is in the boiler room and the oil which operates the presses is piped to them under high pressure through a distance of about 200 ft. Two pressure lines are used—a high and a low. The low-pressure line operates the piston or packing ram used to pack the dough into the cylinders, raises the piston in the pressing cylinder, and raises the cylinders so that they may be shifted into the pressing or filling positions while the high-pressure line extrudes the dough. On all presses the high-pressure piston automatically returns when it has reached the limit of its travel. On the vertical presses the control valves for the high- and low-pressure cylinder are within reach from both the main and first mezzanine floors.



At the right is the top or entrance side of a macaroni die, showing the spiders that hold the pins, while at the left is the exit side of a die, showing the small annular openings through which the dough is extruded

(Photos on this page from F. Moldari & Bros.)

A horizontal press is used for alphabet macaroni, elbows, and similar short pieces. As the dough leaves the press it is sheared off by a single knife blade revolving against the external face of the die. The length of the pieces is governed by the speed of the knife—high speed making short pieces and low speed longer ones. The pressure exerted on the dough and the off-centering of the pin make these short pieces curl up as they leave the die, while in the vertical press the weight of the long rods keeps them straight.

Short goods drop from the horizontal press into an airline and are blown through a long pipe up into a revolving screen cylinder in a mildly heated room on the third floor. This short-time drying hardens the pieces slightly, and they drop via another long pipe back to a shaker on the first floor, where they are agitated on screens, as they are still somewhat soft and must be kept from sticking together. From the shaker the pieces are spread on trays about 5x2½ ft. with bottoms of fine-mesh copper screen. These are loaded on trucks and sent to the curing rooms.

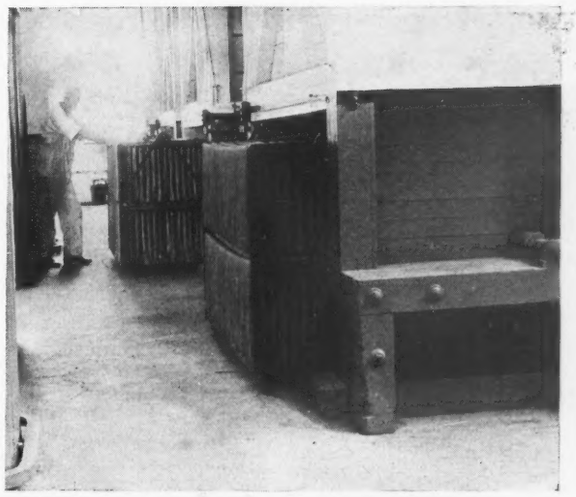
Returning now to the noodles, the pieces of kneaded noodle dough are placed in a "dough break" or "noodle break." This consists of a pair of reversible revolving polished steel rolls arranged so that the pressure and clearance on the rolls may be changed. The piece of dough is passed back and forth through the rolls like a steel billet through a rolling mill. As the length increases and the dough becomes thinner it is rolled up on a reel.

After the final passage through the break rolls, the reel of dough is placed on the lugs of a short length of chain conveyor and lowered to the noodle cutter and folder on the ground floor. As the length of dough feeds through this ingenious machine, it is cut into thin strips which in turn are cut to about 9-in. lengths and dropped onto the folder. This device consists of three separate steel plates each about 3 in. wide and arranged to turn the outside ones about their inside edges, and the middle one about its center. When the long unfolded noodles are dropped on the folder, first one outside plate and then the other successively turns through 180 deg., each dropping its portion of the noodles onto the middle strip. Each noodle thus has two folds in it. The middle plate then turns upside down and drops the folded noodles upon a screen-bottom tray that has been moving through the machine underneath. The trays thus contain rows of folded noodles spaced equally along their lengths.

Both macaroni and noodles are now ready for curing. This term is used rather than drying, as the latter is somewhat misleading. It is true that the water is taken out in curing; in fact, even more water is taken out than was put in at the time of mixing, leaving the finished product with a lower moisture content than the original semolina. This curing process is carried on by the circulation of heated air with a high humidity, and during this time it is necessary that changes take place in the macaroni other than removal of moisture. The temperature and humidity must be very carefully controlled during the curing, for if actual drying of the dough occurs without the peculiar change of state that makes it macaroni, it will be crumbly and even disintegrate—in other words, return to its original state, semolina.

Curing is the delicate process of making good macaroni, and when properly done it assures a finished product which is thoroughly dry, strong in texture, and when cooked retains its shape, is very tender and pleasant to the taste, with a noticeable absence of starchiness.

At the Fontana plant a special curing room (patented)



Loaded trucks of macaroni, entering the drying or "curing" tower

has been devised. It consists of a tower-like room 10 ft. wide, 40 ft. long, and three stories (about 50 ft.) high, heated by air blown through steam-heated pipe coils. Each room holds 64 trucks when full. Each one is divided into eight vertical passes. Short shafts with a sprocket wheel on the interior end extend through the walls at the top and bottom of each pass. A chain carrying lugs at suitable intervals passes over the wheels. The lugs lift each truck of macaroni by the vertex of an iron triangle on the ends of the truck and start it on its first trip through the curing room. A 3-hp. motor operates the lifting system.

If curing is incomplete in one passage through the room, the truck is returned to the entrance and put through again. Usually, more than one passage is required, as 24 to 40 hours is necessary for proper curing. Automatic temperature and humidity control are used within the rooms, but the end point of the curing must be determined by inspection—that is, from its appearance, the ease with which it may be broken between the fingers, and similar simple tests.

Noodles and short goods are cured on the screen-bottom trays previously mentioned.

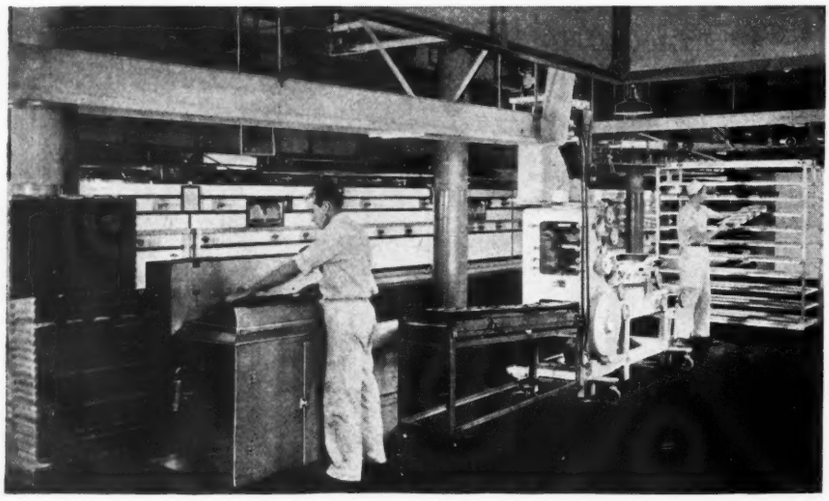
Trucks of cured macaroni and noodles are stored in the open space alongside the curing rooms until cool or until needed in the packing department.

Packing-department operations are conducted on the straight-line principle as far as possible. Long goods are removed from the trays and placed on a canvas belt that passes under a series of rotating disk knives. An upper canvas belt presses lightly against the macaroni while the knives cut it into lengths to fit the packages. Cut lengths travel on a canvas belt along the packing line, where girls weigh them into the cartons that have been formed on machines near by.

Waxed and silicated cartons lined with waxed paper are used. After filling, the cartons pass through a folding and closing machine and finally through a wrapping and sealing machine to receive the printed outer wrapper. The mechanical equipment of this line will handle 100 cases (2,400 packages) per hour.

Packages of short goods—alphabets, elbows, shells, and the like—are filled automatically by a weigher and filler. The packages are checkweighed occasionally.

Bulk short goods in 10- and 20-lb. boxes are filled directly from the trays by hand. After the lid is nailed on, the box is sealed with strips of blue paper.



Convenient placing of equipment, avoiding unnecessary steps or other lost motion on the part of workers, is obtained in this bakery by the use of equipment mounted on wheels

Fatigue Reduction

INCREASES PROFITS

By C. O. SAPPINGTON
Director, Industrial Health Division
National Safety Council

IT IS well known that there is considerable economic loss in manufacturing industries as the result of fatigue among workers. One investigator estimated some years ago that the cost of fatigue among the industries of the United States, in production losses alone, was not less than 20c. per day per worker, or an annual total of more than $2,000,000,000. This loss from fatigue was stated to have been at least four times the annual fire loss among these industries; and fatigue loss, like fire loss, was continuous year after year.

Many investigations have been and are being conducted in a study of fatigue among workers. Some of these surveys have been chiefly from the medical or health viewpoint, others from the viewpoint of factory efficiency programs and production costs, and others chiefly sociological.

During the past two and a half years important studies of fatigue and efficiency have been made among the employees at the Hawthorne Works of the Western Electric Company in Chicago. The workers who have been under special investigation have been employed at repetitive tasks and under conditions quite similar to many workers in the food industry. The results are considered merely tentative, but they have been accepted as of real importance by the research bodies to which they have been reported.

These investigations have been summarized as seeming to show, at least tentatively, that:

1. The total daily output is increased by rest periods and not decreased.

2. The conditions of work during the working day have more effect on production than the number of working days in the week.

3. "Outside" influences—that is, conditions not directly relevant to the task—tend to create either a buoyant or depressed spirit which is reflected in production. A distinct relationship is apparent between the emotional status of the workers and the consistency of their output.

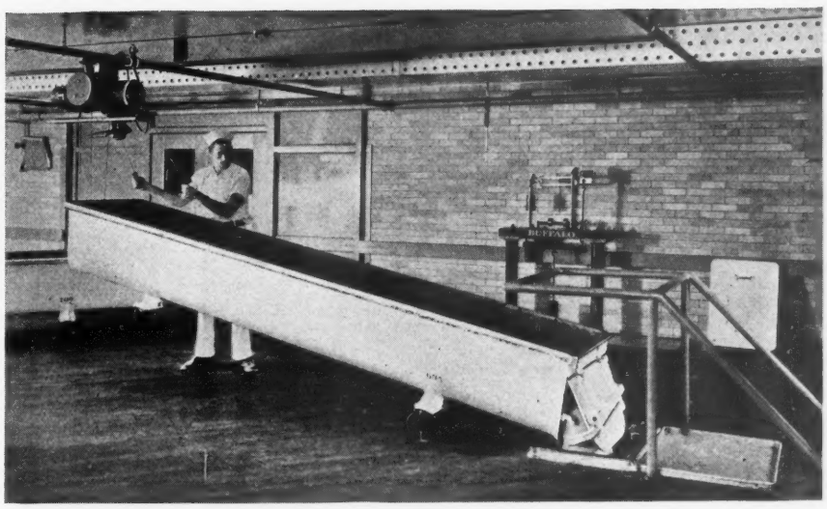
4. The method of the supervision is the most important single "outside" influence. Home conditions may affect the worker and his work; and a supervisor who can "listen" and not "talk" can, in many instances, almost completely compensate for such depressing influences.

5. Pay incentives do not stimulate production if other working conditions are wrong.

As a result of these tentative conclusions, showing the important effect of "supervision" on the fatigue and efficiency problem, the company some time ago started a plan for "interviewing" all of the 40,000 employees. At the time of the report that is here quoted, over 13,000 of these employees had been "interviewed."

The problem of fatigue is very broad. One expert investigator in this field had listed 24 distinct possible causes, or factors, in fatigue. These relate to the two main groups of working conditions and home conditions affecting the individual. Working conditions which are possible factors in fatigue include hours of work, speed, rhythm, concentration, complexity, noise, vibration, heavy weights, posture, danger of accidents, health hazards, monotony, ventilation, light, space, and excessive cold or heat in the particular work of the operator. Closely associated with these shop conditions as possible added factors in fatigue are food, sanitary and washing facilities, drinking water, transportation to and from work, personnel relationship with management, the experience of the worker in his job, the clothing that he wears, his wages, and even such minor conditions as odors and aesthetic surroundings associated with his work.

Such working conditions may be supplemented by other more personal and individual factors bearing on fatigue production. These may include the adaptation of the worker, both physical and psychological, to his job. They would include his personal worries, his age, and his health, including his physique and general constitution. Further conditions which may affect the fatigue of the worker are his home conditions, including his housing, his condition as related to poverty, and his habitual amusements.



Devices that do away with heavy lifting help workers to avoid fatigue, as does this hoist used for tilting bread troughs

A certain degree of fatigue of the worker is a normal result of body activity and is harmless. From the medical viewpoint, fatigue becomes harmful if carried to the point where a complete rejuvenation does not take place after a reasonable period of rest. This quality of fatigue not only lowers the efficiency of the worker but it may also slowly undermine his health. It has not been sufficiently recognized that this condition of overfatigue may be brought on unnecessarily, and may be caused by working conditions or living conditions which should be corrected.

The average person is likely to think of fatigue as merely tired muscles. But a physiologist would explain that in such a case it is generally the nervous mechanism controlling the muscles that is tired. Thus, fatigue is recognized as being of three kinds:

1. Ordinary physical fatigue, due to muscular exertion.
2. Mental fatigue, due to the use of the mind.
3. Nervous fatigue, due to exhaustion of nerve force.

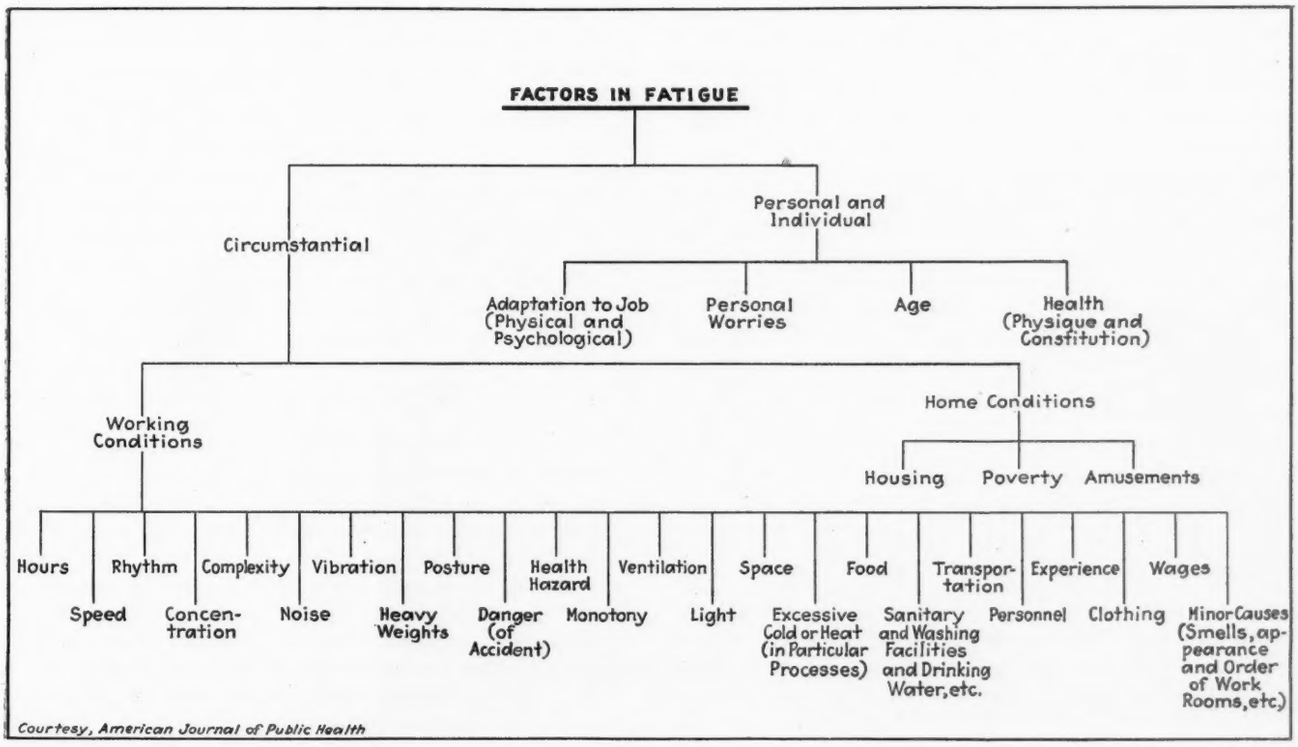
This almost always is the result of whipping the body to further exertion beyond the point of either physical or mental fatigue.

Each food manufacturing plant naturally has its own fatigue problems. Fatigue has been investigated from all points of view. Medical experts have devised methods of determining when a person is fatigued, by testing his blood, etc. However, there are general practical tests which are usually quite reliable. The plant manager or foreman usually can tell whether his workers are becoming fatigued by observing:

1. If they are listless and inattentive.
2. If their hourly rate of production falls off.
3. If there has been a decrease in the amount of power used.
4. If there is an increase in the amount of work that does not pass inspection.
5. If there is an increase in the frequency of accidents.

Because fatigue relates to nervous energy, a common evidence of fatigue is slowness to respond to stimulation. The worker who is fatigued literally does not see, hear, understand, or act with his accustomed speed. This result may not be due at all to the conditions of his employment. It may be the result of the employee having enjoyed a previous evening of pleasure, or the result of worries about home problems.

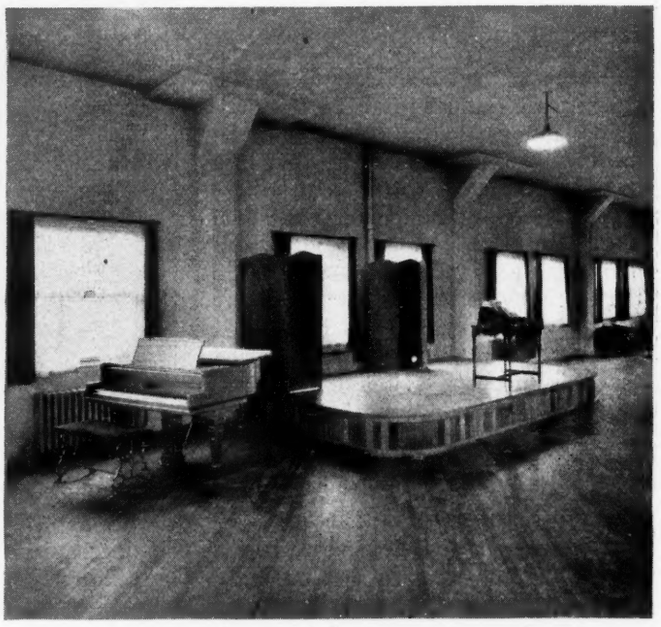
It is quite evident, of course, that a person is more quickly fatigued when working at a job which he dislikes. Thus, it is important that the job should be fitted as nearly as possible to the worker. His fatigue thus is lessened and his output normally should be increased. This suggests one important reason why it may be a



Courtesy, American Journal of Public Health

Cool, pure drinking water, available at convenient points about the plant, helps to keep workers in a healthy, fresh condition

The mental attitude of employees is important and nothing tends toward a good mental attitude more than opportunity for enjoyable recreation



good investment to start all new employees at their work with a thorough physical examination, supplementing this with proper placement.

The health of the worker may be affected by fatigue which may come from worrying. Worry is caused by fear, and fear takes a variety of forms. For example, the safety engineer of a plant knows that one of the great values of safety appliances and safety habits is the elimination of personal fear, and the development of the kind of self-confidence that is necessary to the best achievement. In hazardous occupations, where safety precautions have not been taken properly into consideration, there naturally results a tenseness of muscles and nerves which may result in fatigue and lessened output.

An important possible cause of worry and mental fatigue among workers is incompatibility and sickness at home; or conditions of poverty which the worker cannot eliminate from his mind. This emphasizes one of the values of the plant visiting nurse, to whom the worker can confide his home troubles and thus relieve his own mind.

Another leading cause of worry and fatigue is the thought on the part of the worker that he is in the grasp of an incurable disease. Consultation with a competent plant physician may soon prove that his worries are without foundation. Even minor physical ailments often produce worries and fatigue, if the worker is not able to adjust himself to these ailments. This may include such conditions as eyestrain, flat feet, constipation; or a focus of infection in his tonsils, teeth, or elsewhere, which may considerably reduce endurance.

Thrift campaigns, including instruction or tactful assistance in how to spend or invest wages, may have value in the reduction of fatigue. Proper amusement or recreation may assist in overcoming fatigue. One industrial plant manager believes that he has achieved good results through what he calls "the home reading box," containing a plentiful supply of literature of all sorts for his workers to take home or to read during noon hours.

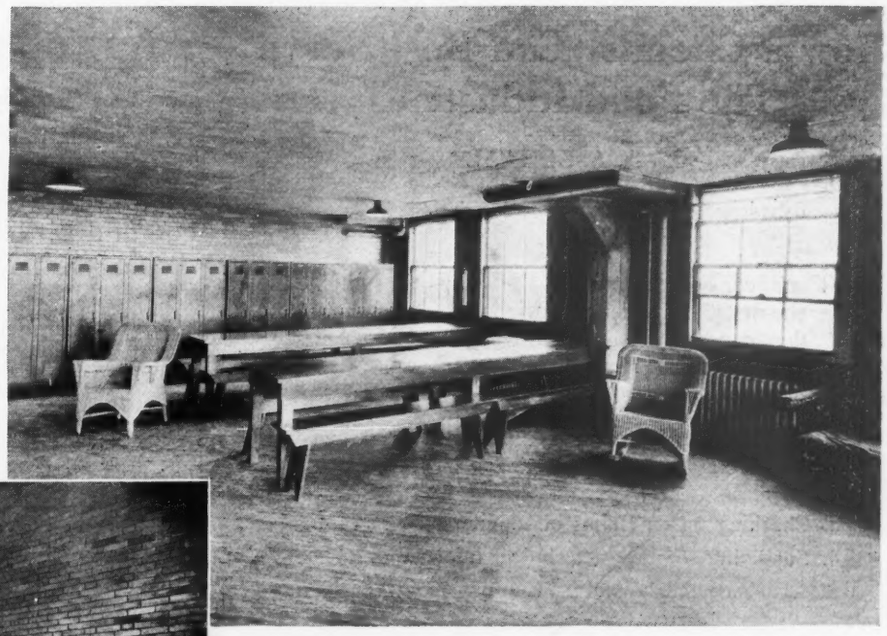
There often is an important relationship between fatigue and hours of work. In many cases, where the work is rapid or tense or monotonous, the plant output has been increased through the introduction of rest periods or recesses. Chairs more properly adjusted to the comfort of the worker may answer the same purpose. It has been found profitable, in certain plants, to carefully instruct the new worker in his duties and to insist on shortened hours during the the first few days, so that the worker may not become too tired or discouraged. Where rest periods or recesses have been declared, the recess should be obligatory for all workers, in order to get the best results. Many workers come in the morning without sufficient food and the rest period enables them to get the kind of nourishment necessary to best efficiency.

Studies in fatigue have demonstrated that the capacities of different workers vary greatly as to speed. To secure the best uniformity of production and comfort, there are many operations in an ordinary plant where the workers should be carefully graded as to their normal reaction speed. Closely related is what has been called working "rhythm." Efficiency experts are sometimes able to achieve a great deal through a simple study of the rhythm of the motions of certain processes, and through the possible rearrangement of these processes.

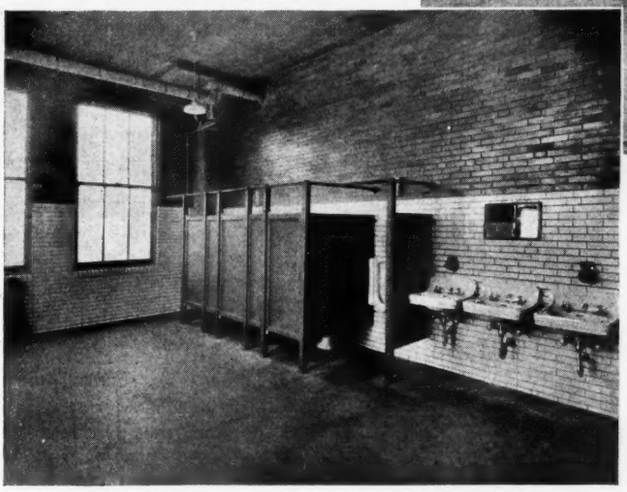
For this same reason fatigue may be lessened through diversity of work, a mingling of monotonous work with other kinds. Long exposure to noisy conditions may produce fatigue. Often such annoyance may easily be removed through the use of rubber tires on trucks, the elimination of metal fasteners on high-speed belts, and attention to machinery connections and bearings. The tiring effects of excessive vibration in some plants may be lessened through equipping the chairs or stools with springs to counteract this vibration. Fatigue from heavy or monotonous lifting often may be easily overcome through the substitution of machinery, mechanical lifting devices, conveyors, or improved working places, which also usually result in increased process efficiency.

Investigations have demonstrated that an incorrect posture may be an important cause of fatigue. Such a

Light, cheerful rest rooms are a requisite in plants hoping to obtain good results from the work of girl employees



Health, comfort, and a good mental attitude are promoted by sanitary, light, adequate toilet facilities



posture is often the result of faulty design and layout of working places or improper seats and chairs. The design of a chair should depend upon the class of work, and the chair should be adjusted individually to the worker.

Foot rests are important in the relief of fatigue, and they should always be wide enough to accommodate the entire length of the foot. A wide foot rest reduces fatigue because it permits a change in position not possible with a narrow foot rest.

Accident charts indicate that there may be a close relationship between fatigue and accidents. These charts show an increasing number of accidents toward the end of working periods. The peak of the accident curve usually comes previous to the end of the period. One possible explanation is that the anticipation of the end of the working period, including food and rest, may make the worker more alert and alive to the dangers of his surroundings; or it may be that less work is actually performed during this last hour.

Fumes and dust, and excessive heat or cold, often cause fatigue as well as injury to health. Poor lighting likewise causes fatigue, due to the necessity of overtenseness and eyestrain, in addition to a usual increase in accidents and decrease in production. Many plants have found it profitable to examine the eyes of all employees, and especially those who are doing so-called "fine" work.

Some investigators state that fatigue is very often caused by serious errors of diet, improper selection and preparation of food, and irregularity in time of eating. Recess periods for eating in plant lunchrooms thus have an important relationship to working efficiency. Clothing that is suitable to the work, and especially comfortable shoes, are important in the reduction of fatigue. A neat and attractive appearance of the plant and the practice of good housekeeping likewise are factors in fatigue.

Fatigue has long been called "the great industrial disease." Fatigue probably is closely related to general efficiency, to accident prevention, and to all of the factors which are included in the term "plant morale."

Comfort for the worker, obtained by such means as correct-posture chairs, correct table heights, and accessibility of material, does much to lessen fatigue

How a Chemist Can Best Serve The Food Industries

By A. A. SCHAAL
Technical Bureau
Biscuit and Cracker Manufacturers' Association
Minneapolis, Minn.

LET us consider some of the ways in which the chemist can render a service to four of the major departments in the organization:

In the purchasing department the chemist will find that he can aid in

1. Developing specifications on raw materials.
2. Interpreting plant operations in terms of raw materials.
3. Checking up on claims of suppliers.
4. Supplying sources of technical information.
5. Disposing fairly and efficiently of new brands and types of materials.
6. Enhancing the prestige of the department with supplying houses.
7. Conveying helpful information to raw material suppliers who too often must grope in the darkness on how their materials are being used.

The chemist can render valuable assistance to the production department in

1. Maintaining uniformity on finished goods.
2. Reducing the cost of production through substitution of ingredients, elimination of unnecessary processing, discarding worthless ingredients, and duplicating high priced proprietary raw materials.
3. Interpreting scientific facts in terms usable by the production manager.
4. Making small scale experimental runs.
5. Introducing new raw materials into the mixes.
6. Acting as a liaison officer with other departments.
7. Insuring proper co-operation at all times with government officials in the administration of the food laws.
8. Gradually substituting science for art in old industrial procedures.

The chemist will find working closely with the accounting department very profitable. It is this department which can help him most in evaluating in dollars and cents the results of his work. He can render aid to the cost accountant in

1. Helping to select the items on which an intensive cost analysis should be made.
2. Explaining abnormally high costs.
3. Developing methods for obtaining cost data on items where so-called "invisible" factors are operating.
4. Interpreting cost data for the production manager.

The sales department will soon find that it should call upon the chemist for help in

1. Developing effective and ethical advertising copy.
2. Supplying salesmen as a group with authentic information on the food value of products.
3. Handling certain correspondence such as that with educational institutions on the place of foods in the menus.
4. Checking up complaints on deliveries.
5. Assisting in proper co-operation with the production department.

Considering the departments of the plant as a whole, the chemist may in time

1. Take the leadership in forming study or training groups.
2. Assist the general superintendent in synchronizing certain operations common to several departments.
3. Become the plant question box for information commonly thought to be in the hands of the scientifically trained man.

There is little or no opportunity, of course, for any fundamental research work in the average plant. Practical research, however, must be carried on at all times, and it offers delightful opportunities to the chemist to make his department pay dividends. The following points are mentioned as some that should be kept in mind in selecting and carrying out such practical research work:

1. The problem must originate, of course, within the plant.
2. The research work must be selected to increase the profits of the plant.
3. The loyalty, faith, and co-operation of the men in the shop must be secured and maintained.
4. During the progress of the work the men in departments that are concerned should be acquainted with the plan of the experiment. This is an effective means for building future good will toward the chemist.
5. Proper help from plant executives will minimize interruptions, interferences, and unnecessary delays in the work.
6. It must be assured that proper credit be obtained for the accomplishment. If the work was conducted so as to develop an esprit de corps, there is little danger of the chemist not receiving proper credit.
7. Finally, when the work is completed, support must be given by the proper executives for utilizing the results and translating them into profits.

Sooner or later, every chemist will find a hobby in the organization with which he is connected. It may be cost accounting, production, sales, or some other phase of the business. Such hobbies invariably develop around the special abilities of the man. When the chemist sees this development of his interest, he has only to nourish it and correct his shortcomings, in order that he may eventually assume an important responsibility in that phase of the organization.

There are splendid opportunities in the food field for the chemist with a good chemical training used as a tool along with those other vital qualities of proper mental attitudes, tact, creative ability, initiative, resourcefulness, loyalty, and leadership. If he keeps his development thus rounded out he should occupy in time a position of leadership in the plant.

In *Food Industries* for September, Mr. Schaal, in an article entitled "Mapping a Course for a Chemist in the Food Industries," briefly indicated how the food plant management should help the young chemist make himself useful, and the qualifications and course of conduct that the chemist seeking a career in food manufacture should keep in mind. In the present article, the author defines the service that the food field can expect from the young chemist.

Treating Grain for

THE DESTRUCTION OF INJURIOUS INSECTS

By LAUREL DUVAL
Chief, Grain Inspection Department
New York Produce Exchange

NO ACCURATE data are available concerning the losses sustained in the United States on account of injurious insects in stored grain. However, it is a fact that the wastage due to insect damage to grain crops during storage is enormous and runs into millions of dollars annually.

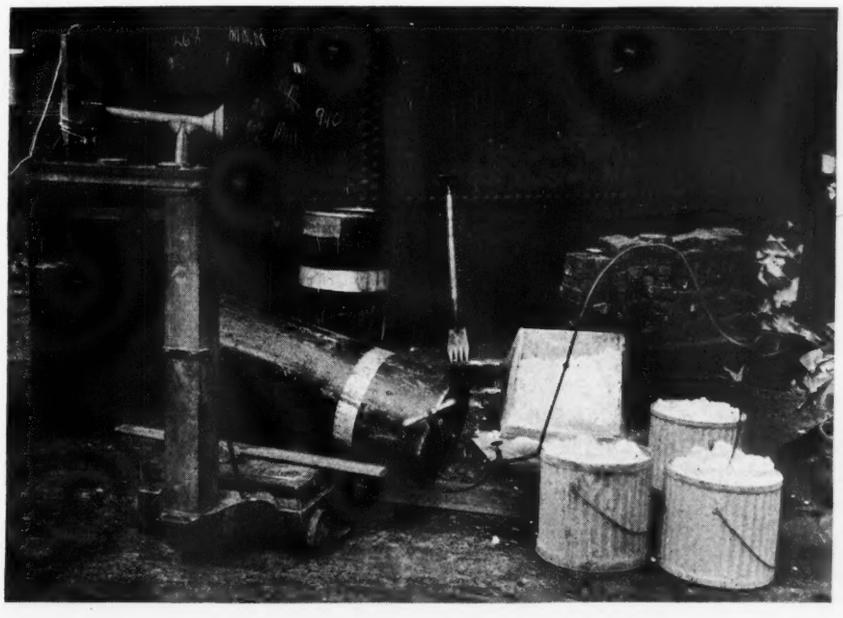
The most common pest is the rice weevil (*Sitophilus oryza L.*). During the past year this species was found in grain over a very wide territory, probably because of the large carry-over of old-crop wheat. It is not universally known that this species is able to fly and frequently infests grain in the fields as well as in storage.

The confused flour beetle (*Tribolium confusum duv.*) usually is prevalent and, although little or no damage is done directly to the grain by this insect, it multiplies rapidly under favorable conditions, and causes heavy losses due to heating when permitted to colonize in bins.

The Angoumois grain moth (*Sitotroga cerealella ol.*) gives much trouble to farmers and merchants in many states.

The granary weevil (*Sitophilus granarius l.*) is a pest of minor importance compared to the rice weevil. However, it is encountered frequently in cereals from the northern part of the grain belt and is somewhat more difficult to kill than the more common and the more widely distributed rice weevil.

Ethylene oxide being weighed into crushed "DryIce" outside grain elevator
Each can contained sufficient fumigant for 2,000 bu. of grain
(By courtesy U. S. Dept. of Agriculture)



The granary weevil and the rice weevil are similar in appearance, particularly in their early stages, when it is difficult to distinguish between the two species. The granary weevil, unlike the rice weevil, cannot fly and does not occur in ripened grain in the fields.

In the past, numerous mechanical methods have been employed in attempts to control insects in stored grain. The most common treatment of infested grain included screening, blowing, aspirating, transferring, and cooling. Sometimes fair results are obtained by splashing the grain against hard surfaces while transferring. Besides these mechanical manipulations, many others of similar nature are utilized with varying results.

Perhaps the method most frequently used, where relatively low air temperatures occur, is to cool the grain by transferring or by chilling the grain in dryers. If grain is first cooled, then cleaned, many more insects are removed than if the grain is cleaned without first cooling.

Every elevator operator is familiar with the fact that when grain is very cold little trouble is encountered, because at low temperatures insects are dormant. However, when grain is cool, but not sufficiently low in temperature to render the insects inactive, the greatest losses sometimes occur, due to the "bunching" of the insects in the bin, causing the grain to become "warm" or "hot."

Large quantities of wheat are marketed during July, August, and September. The normal temperature of this wheat ranges mostly between 70 and 80 deg. F. These temperatures are ideal for the development of weevils. Cooling such grain to a temperature at which the weevils will remain comparatively inactive (below 50 deg. F.) by transferring, or in cooling sections of dryers, is impossible until late autumn or winter. In the meantime the weevils have greatly increased in numbers, resulting in warm and damaged grain.

Back and Cotton (*Journal of Agricultural Research,* XXVIII, 10, June 7, 1924), give some carefully collected data concerning the resistance of individual weevils to low

Fumigating with ethylene oxide-"DryIce" mixture by trickling mixture into grain stream as it is run into closed-top concrete bin

temperatures. They found, with a temperature ranging from 50 to 60 deg. F., the normal life of the weevil was greatly prolonged. Adults of the rice weevil lived in this temperature for a period of 558 days. The normal life of this insect is from 100 to 200 days during its period of greatest activity in summer temperatures.

It was necessary to reduce the temperature to between 40 and 45 deg. F. before there was an appreciable shortening of the life of the insect. Even at these comparatively low temperatures, adults of the rice weevil lived for 80 days. When temperatures were reduced to from 35 to 40 deg. F., it was 18 days before the weevils were killed. At temperatures of 25 to 30 deg. F., it required 8 days to kill rice weevils. And exposure of 4½ hours was required to kill adults of this species at 5 deg. F.

It is evidently extremely difficult to kill weevils by chilling the wheat, because it is seldom possible to have favorable weather conditions over a sufficient period of time to lower temperatures to the killing point in large lots of grain. In order to lower the temperature of the grain from 70 to even 50 deg. F., by transferring in air temperatures as low as 20 to 25 deg. F., a number of transfers are necessary, especially where the grain is in concrete storage, the walls of which require considerable time to cool. Cooling grain in grain dryers is rather costly, especially as the effect may be only temporary, unless the grain is cooled to freezing temperatures, which is very difficult to accomplish with large quantities of grain in most markets.

Another method of control is to heat the weevily grain in dryers for several minutes. A temperature of 130 to 150 deg. F. for 30 minutes is certain death to weevils and their eggs. However, this is a very costly method, due to the shrinkage in the weight of the grain, and therefore is not often practiced.

The chief difficulty with nearly all the methods heretofore employed in modern elevators, however, is that the weevils are not destroyed or removed in sufficient numbers to eliminate the hazard, except at too great a cost. Unless the weevils are practically all destroyed and the eggs killed, the process must be repeated at frequent intervals, which adds materially to the carrying charges, by reason of the cost of handling and shrinkage in weight of the grain. Furthermore, with the strict rules for sampling and inspecting grain in vogue during the past few years, uncertain methods are losing much of their former popularity.

Fumigation unquestionably offers the best solution for the insect problem. Although this means of weevil control is increasing it has not become a universal elevator practice for a variety of reasons. In my own commercial grain work, extending over a period of many years, I have used or investigated nearly all of the fumigants suggested by competent authorities, only to abandon them for one or more of the following reasons:

1. The fumigant was too hazardous to human life or too disagreeable to handle.
2. The chemical had a deleterious effect on grain, causing objectionable odor or other injurious effects.
3. The cost of the material made its use uneconomic.
4. The fumigant could not be used successfully at sufficiently low temperatures.
5. The inflammable nature of the fumigant made it impossible to obtain necessary approval of the proper insurance authorities.
6. The vapors were not sufficiently toxic to insects, making a high percentage of kill impossible under normal conditions.
7. The liquid fumigant could not be successfully applied in all types of bins, which resulted in too many cases where the kill was too low.

ETHYLENE oxide, the vapors of which were recently discovered to be highly toxic to insects (Cotton & Roark, *Ind. Eng. Chem.*, 20,805, 1928), furnishes an excellent fumigant. It is not disagreeable to handle and is relatively non-toxic to man. Its odor may be described as sweet and it leaves no odor or taste on the grain.

The Grain Division of the U. S. Department of Agriculture reports that ethylene oxide vapors have no harmful effect upon the milling and baking qualities of the grain. It is not too expensive, especially if the results are considered. Its inflammable features are eliminated by mixing it with carbon dioxide (7½ parts carbon dioxide to 1 part ethylene oxide is sufficient; see Jones & Kennedy, *Ind. & Eng. Chem.*, February, 1930).

The molecular weight of the two gases is nearly the same, so that there is no material separation of the gases after the mixture is released. Carbon dioxide itself has toxic qualities for insects and it apparently quickly stimulates respiration (Cotton & Young, *Ent. Soc. Wash.*, Vol. 131, No. 5) in the insect, which hastens its death from the ethylene oxide vapors. This is a very important factor because it has been impossible heretofore to obtain satisfactory results with most fumigants at the lower temperatures, due to the inactivity of the insect. Excellent results have been obtained in ethylene oxide-carbon dioxide fumigation with grain temperatures well below 50 deg. F.

The elevator operator will readily appreciate the value of a fumigant that can be effectively used at low temperatures, thus obviating the necessity of continually watching and frequently turning cool grain known to be infested with weevils.

During the latter part of 1929, in co-operation with the U. S. Department of Agriculture, Bureaus of Economics, Entomology and Chemistry, and the Carbide & Carbon Chemicals Corporation, manufacturers of ethylene oxide (Back, Cotton, Young, and Cox, mimeograph U. S. Department of Agriculture., July, 1930), a method was

Results of the Fumigation With Ethylene Oxide-Solid Carbon Dioxide Mixture of 70 Lots of Weevily Wheat in Steel Closed-Top Bins, Concrete Closed-Top Bins, and Concrete Open-Top Bins

Type of Bin	Average Number of Live Weevils per 2,000 Grams Before Fumigation	Range in Number of Weevil per 2,000 Grams Before Fumigation		Average Temp. of Grain Before Fumigation, Deg. F.	Range in Temp. of Grain, Deg. F.		Kill as Shown by Control Specimens		Kill Shown by Composite Samples, Per Cent	Number of Lots Fumigated
		Min.	Max.		Min.	Max.	Buried in Grain, Per Cent	On Top of Grain, Per Cent		
Steel, closed top	10	6	14	50.5	46	54	100	100	100	4
Concrete, closed top	18	4	74	56.8	44	88	100	99.8	99.7	16
Concrete, open top	21	16	28	57.7	50	64	No controls	No controls	99.6	3
Concrete, open top	14	4	50	55.9	48	72	100	95.3	99.0	42
Concrete, open top	7	2	12	52.5	50	56	No controls	100.0	98.0	5

Fumigations in closed-top steel bins resulted in 100 per cent kill in all cases.

Fumigations in closed-top concrete bins resulted in 100 per cent kill in 87½ per cent of the lots treated.

Fumigations in open-top concrete bins resulted in 100 per cent kill in 72.3 per cent of the fumigations.

The minimum kill in any lot fumigated was 96.6 per cent in a large open-top concrete bin of 55,000 bu. capacity, 32 ft. in diameter.

devised for the application of ethylene oxide to grain fumigation by its use with solid carbon dioxide ("DryIce").

"DryIce" has a temperature of 110 deg. F. below zero. When it is mixed with ethylene oxide it prevents the latter from evaporating while it is being applied to the grain. By reason of its extreme coldness it also has a cooling effect on the grain. This "chemical ice" is available in practically all large grain centers and is received in containers designed to preserve it from evaporation before it is used.

Results have demonstrated that this combination makes a powerful insecticide when mixed in the proportion of 3 lb. ethylene oxide to 30 to 35 lb. of solid carbon dioxide for each 1,000 bu. of grain to be treated. The method of applying this mixture in commercial grain fumigation is described as follows:

The solid carbon dioxide is crushed so that the largest pieces are not more than 1½ in. in diameter. Fifty-four to 60 lb. of the crushed ice is then placed in buckets, to which is added exactly 6 lb. of ethylene oxide. The ethylene oxide should be well distributed through the ice. A shovelful of elevator dust in the bottom of the bucket will absorb any small quantity of ethylene oxide not taken up by the ice. The mixture is made outside the elevator and taken to the bin floor ready to use. Each bucket contains sufficient material to treat 2,000 bu.

A small shovel with a long handle, which will permit the operator to keep away from dust as much as possible, is employed to trickle the mixture into the grain stream. For large operations a machine similar to the one illustrated may be utilized. This machine is equipped with a screw conveyor operated by a vapor-proof or induction motor to avoid dust explosions. An even distribution of the mixture is essential; therefore an accurate check should be kept on the quantity of grain flowing into the bin and the operations so timed that each batch is evenly distributed throughout the 2,000 bu. A small shovelful of the insecticide should be dropped into the bin immediately before the grain is started. It is likewise desirable to use a double dosage in the first 500 bu. or until the hopper is well filled.

A small truck provides a handy method of conveying fumigant to bin after it is taken to bin floor

In closed bins a few shovelfuls of the insecticide, the amount depending on the diameter of the bin, spread on top of the grain is desirable. Open-top circular bins having a diameter of about 30 ft. were successfully treated by leaving approximately 10 ft. space between the top of the grain and the top of the bin and spreading four batches of the insecticide over the top of the grain. The grain should not be turned for at least four days after fumigation.

During the past season millions of bushels of grain have been treated with ethylene oxide-carbon dioxide mixture with excellent results. Seventy commercial fumigations made in various types of bins containing wheat having a wide range in weevil infestation and temperature of grain are summarized in the accompanying table.

In order to have a check on the kill in each lot of grain treated, as shown by composite samples of the grain before and after fumigation, control samples containing a definite number of live weevils were buried in the grain throughout the bins, in practically all cases. Control samples were placed also on top of the grain to ascertain the percentage of kill on the surface of the wheat in the bins.

Four lots of wheat were treated in closed-top steel bins. The wheat in these lots contained an average of from six to fourteen live rice weevils per 2,000 grams (about 4½ lb.), and the temperature of the grain ranged from 46 to 54 deg. F. The result was a 100 per cent kill throughout, as shown by composite samples before and after fumigation and by the control samples. In sixteen lots fumigated in closed-top concrete bins, the wheat contained from 4 to 74 live weevils per 2,000 grams and had a temperature from 44 to 88 deg. F. The kill in the buried controls in all lots was 100 per cent. Controls on top of the grain averaged 99.8 per cent kill, and the composite samples showed 99.7 per cent kill.

The open-top concrete-bin fumigations were divided into three groups: Three lots where there were no con-

trol samples or where these samples were lost or torn in running the grain from bins after fumigation, 42 lots with controls buried in various places in the grain and on the surface, and five lots with control samples on top of the grain only.

The first three lots fumigated in open-top concrete bins showed an average kill of 99.6 per cent, based on composite samples taken before and after fumigation. The range in the temperature of the grain was from 50 to 64 deg. F.; the average number of live weevils per 2,000 grams was 21, the minimum 16, and the maximum twenty-eight.

In the second group of concrete open-top bins the infestation ranged from 4 to 50 live weevils per 2,000 grams, or an average for each lot fumigated of fourteen live weevils. The temperature of the grain ranged from 48 to 72 deg. F. The average kill in the controls buried in the grain was 100 per cent, on top the kill was 95.3 per cent, and the composite samples showed 99 per cent.

In the last group, consisting of five lots, an average of seven live weevils per 2,000 grams was found and the temperature of the grain ranged from 50 to 56 deg. F. A 100 per cent kill was recorded in the controls on top and a 98 per cent kill was shown by the composite samples.

Grain treated in closed-top steel bins resulted in 100 per cent kill in all cases. Fumigations in closed-top concrete bins showed 100 per cent kill in 87½ per cent of the lots fumigated. Open-top concrete bins showed 100 per cent kill in 72.3 per cent of the fumigations.

The lowest percentage of kill recorded in any lot fumigated was 96.6 per cent, in an open-top concrete bin 32 ft. in diameter containing 25 live weevils per 2,000 grams.

A slight difference in kill was noted between large open-top bins with a diameter of approximately 32 ft., having a capacity of 50,000 bu., as compared to bins of 15,000 bu. capacity with a diameter of approximately fourteen feet.

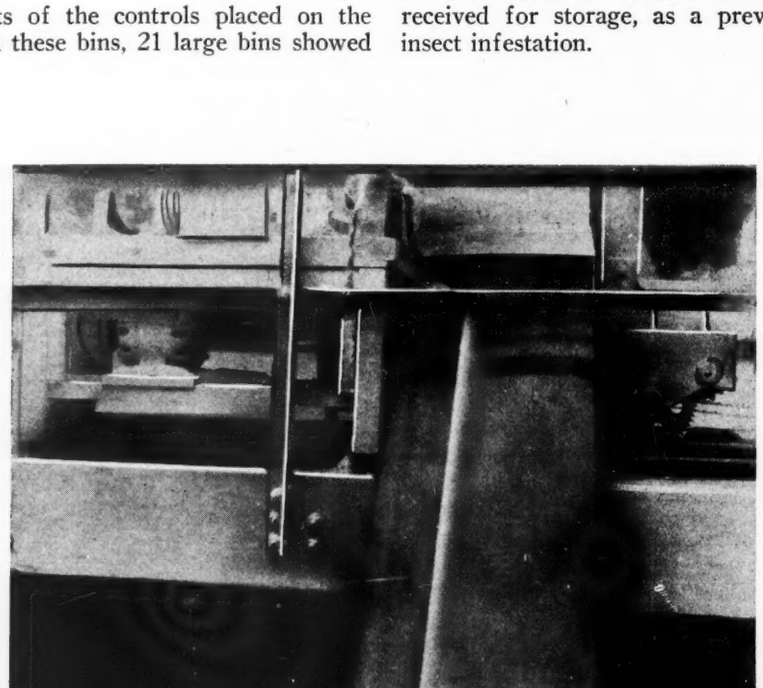
Based on the results of the controls placed on the surface of the grain in these bins, 21 large bins showed 93 per cent kill at the surface, against 98.10 per cent kill in 22 small bins. Probe samples taken from the grain at the surface indicated a kill of 97.9 per cent in the large bins, against a kill of 99.1 per cent in the 15,000-bu. bins.

In conclusion, it may be stated that ethylene oxide-carbon-dioxide mixture is admirably adapted for the fumigation of stored grain intended for any purpose except where high percentages of germination are required. This mixture is in no way harmful to the most delicate food products. Solid carbon dioxide is beneficial to the grain and in combination with ethylene oxide has given evidence, in some instances, that it retards the growth of molds. Both chemicals disappear in the form of gas and do not leave or cause any addition of moisture to the grain.

The mixture is a practical fumigant, particularly for large-scale operations, and can be applied at the maximum rate of transferring grain in modern elevators. Its cost is about one-half cent per bushel, which is not excessive, especially when the high percentage of kill is considered. It has proved effective at grain temperatures as low as 44 deg. F. Successful fumigation at such low temperatures is of immense importance to grain handlers. This fumigant also gave 100 per cent kill at grain temperatures as high as 88 deg. F.

Surprisingly high percentages of kill were recorded with great regularity even in open-top bins of 55,000 bu. capacity with a diameter of 32 ft. A kill of 100 per cent was effected in over 77 per cent of the lots treated, including open-top bins. The average percentage of kill for all lots was 99.1 per cent; the minimum was 96.6 per cent, which occurred in only one case.

Ethylene oxide-solid carbon dioxide mixture may be used successfully at any time. However, the best time from an economic standpoint is as soon as the slightest trace of weevil infestation is noted. In fact, grain that is certain to be held in storage for a considerable period of time could be treated most economically as it is received for storage, as a preventive measure against insect infestation.



Ethylene oxide-"DryIce" mixture being trickled onto grain stream by a machine powered by induction motor. The mixture may be seen on grain stream as a thin white streak

FISH STEAKS

A Standardized Product In a Standardized Package

By HARDEN F. TAYLOR
President, The Atlantic Coast Fisheries Company
New York City

FILLETS of fish present many important advantages over round or whole fish, and their commercial development has had a correspondingly profound effect on the fisheries industry. They are of much less weight, are cleaner, and more convenient, and leave the inedible portion in the producer's hands for manufacture of byproducts. They also are better adapted to distribution through grocery stores and butcher shops. However, as the manufacture of fillets expanded and experience in marketing them accumulated, their limitations became more apparent. Fillets can be made satisfactorily only of fish which happen to be of suitable size, such as the haddock.

To meet the demands for further increase in the distribution of packaged fish, additional requirements had to be met. It should be possible to prepare standardized-package portions of other fishes, large or small, such as cod, salmon, and halibut. The product should be independent of the size or shape of the whole fish; it should be be compact and presentable. Its thickness should be uniform, else cooking will be excessive in thin portions and insufficient in thick portions. Each portion should be of the same size and shape as the others, compact, and readily packaged in an attractive container.

These conditions are not all met by the fillet. The steak or crosscut portion at once comes to mind as a basic idea, but steaks of whole cod, halibut, and salmon are not only too large but are irregular in size and shape and cannot readily be made without skin, bones, and belly walls. Besides, the sections on the tail portion are too small to be salable as steaks. Extensive study in the research laboratory of The Atlantic Coast Fisheries Company showed that steaks could be made that possess all the desirable characteristics mentioned, applicable to a great variety of species of fish and producible by automatic high-speed machinery.

Means were found to cause a mass of fish fillets to adhere, one to another, after freezing and subsequent defrosting. If the mass of fish was made into the form of a cylinder, wrapped in parchment paper, cut off in slices and frozen, the resulting steaks became satisfactory individual portions which could be cooked without falling apart and were identical in composition with the original fillets from which they were made.

But the mechanical production of the steaks was a problem that required solution before the steaks could be offered to the public as a standardized package. After the research laboratory had shown that this form of package was technically possible, it remained for that department, acting in co-operation with the engineering department of the company, to develop an automatic machine to produce them at a low cost. Fish-steak production was a departure from any known form of standard manufacturing equipment, and over two years were required for the development, design, and construction of the first steaking machine.

In principle, the steak machine consists of a cylindrical open trough into which the fillets are laid horizontally and overlapping. From this trough the large cylinder of fish moves forward through a die, on the opposite side of which a rotating bobbin of parchment tape wraps a band of paper around the advancing cylinder of gently com-

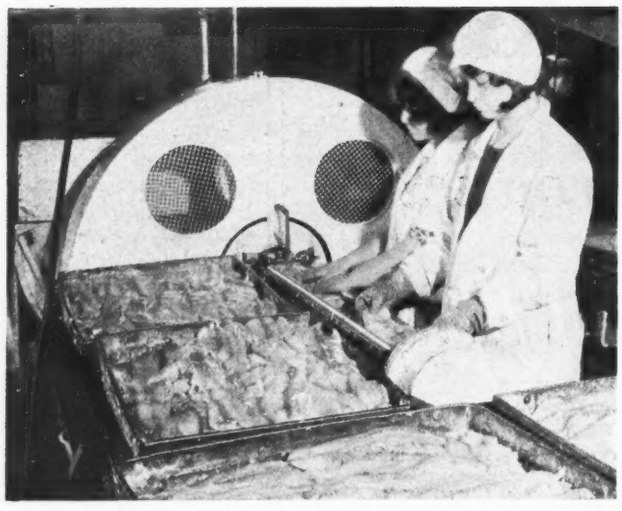


Fig. 1—Filleted fish are fed into the steaking machine by laying the fillets in the trough so that they overlap. Note the screws which force the mass of fish through the compression die

pressed fish fillets. A small spray of water plays on the parchment-covered fish, giving it the cohesion necessary to hold it in place until the steak is frozen.

Next, a rotating knife cuts off successive slices or steaks from the parchment-wrapped, advancing cylinder of compressed fish fillets, after which they are deposited upon the plate of a Cooke freezer and are then frozen solid in approximately 36 minutes. The steak is a disk of solid cross-cut fish flesh, without skin or bones, retained by a band around the periphery.

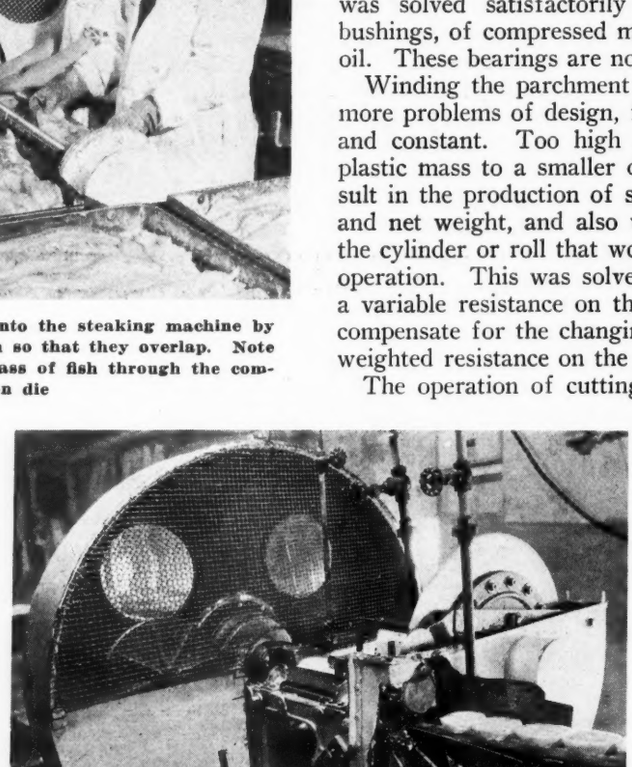


Fig. 2—The bobbin winder revolves in the large case and wraps a band of parchment around the advancing cylinder of fish, after which steaks are cut off by the rotating knife and fall on the belt at the right

Frozen steaks are kept in a temporary freezer storage until they are packaged, two in a carton, and wrapped in a moisture-resistant, regenerated cellulose sheet. The package must be proof against moisture vapor losses; otherwise, marked shrinkage and deterioration of the steaks will occur in freezer storage. The cartoning and tight-wrapping machines required special designing, which, however, was delegated to outside specialists.

The steak machine itself presented many intricate problems of design for which there was no precedent to follow. To lay the fillets into the feeding trough is a simple matter, but to cause them to move forward through the die to the bobbin winder at a uniform rate and with sufficient force to overcome compressing force of the parchment tape is more difficult. The final solution was obtained by making the trough itself of eight continuous screws, the threads of which were rounded to prevent cutting the fish meat. These screws are $1\frac{5}{8}$ in. in diameter and about 4 ft. long. The top side of the trough is open, as shown in Fig. 1, and is the feeding point. Adjacent screws revolve in opposite directions to prevent any tendency of the mass of fish to revolve in the trough. Allegheny metal or chromium-plated bronze was used in constructing all parts that come in contact with the fish, in order to prevent corrosion.

The forward motion imparted by the screws to the fish is sufficient to force the mass through the compression die, which forms a 3.4-in. cylinder from which the steaks are cut. Lubrication of the bearings of the screws in contact with food was another troublesome problem. It required corrosion-resistant bearings that would not contaminate the food with grease or oil. This problem was solved satisfactorily by oil-less phosphor-bronze bushings, of compressed metallic powder, saturated with oil. These bearings are not lubricated in service.

Winding the parchment on the fish cylinder involved more problems of design, for the tension must be gentle and constant. Too high a tension would squeeze the plastic mass to a smaller diameter and consequently result in the production of steaks of too small a diameter and net weight, and also would cause an elongation of the cylinder or roll that would interfere with the cutting operation. This was solved in part by the provision of a variable resistance on the hub of the bobbin so as to compensate for the changing diameter, and in part by a weighted resistance on the advancing wrapped roll.

The operation of cutting off the steak without interrupting the continuous forward flow of the wrapped fish cylinder was probably the most serious problem. Rotating gang knives, operating intermittently with an oscillating motion, were ruled out because of the relative fragility of the mass being cut. It would offer very little resistance to the cutting edge, particularly the outermost portion. Furthermore, it presented a problem of taking away the soft, loosely adherent steaks when piled in groups. Their separation without disintegration would have been most difficult.

Final solution of the cutting-off problem was found in a rotary knife, shown in Fig. 2, whose cutting edge is a combination of helical and spiral curves. This knife, by a simple revolving motion, cuts off the steaks successively and allows them to fall onto a belt whose rate of movement is synchronized with that of the machine. From the belt the steaks are pushed onto the plate of the Cooke

Fig. 3—Placing the steaks on the plates of a Cooke freezer by pushing three at a time from the belt. The freezer plates are in slow but constant motion

freezing machine in the manner shown in Fig. 3. The machine is designed to operate without reciprocating or intermittent motions, so that very high speed is possible. It is now cutting 81 steaks per minute.

The actual rapid-freezing operations, shown in Fig. 4, is the same as was described in the April, 1930, issue of FOOD INDUSTRIES. The frozen steaks are stripped from the plates, as shown in Fig. 5, and are then sent into the cartoning machines, shown in Fig. 6.

The carton, made to contain two steaks side by side, is of white, patent, coated, manila, sulphite stock, paraffined inside and outside. It has an oblong window with rounded corners, through which parts of both steaks may be seen. The seam is sealed with moisture-proof adhesive.

The cartoning machine opens the flat folded carton at the rate of 60 a minute, inserts a pair of the frozen steaks and a folded leaflet, which gives the instructions for cooking the steak, closes, and delivers it to the wrapping machine. This machine is close-coupled to the cartoning machine and operates in synchronism with it. Here the window carton is tightly wrapped with a moisture-resistant transparent material and is sealed with a material discovered by the research department of The Atlantic Coast Fisheries Company. This substance is monomethyl ether of ethylene glycol.

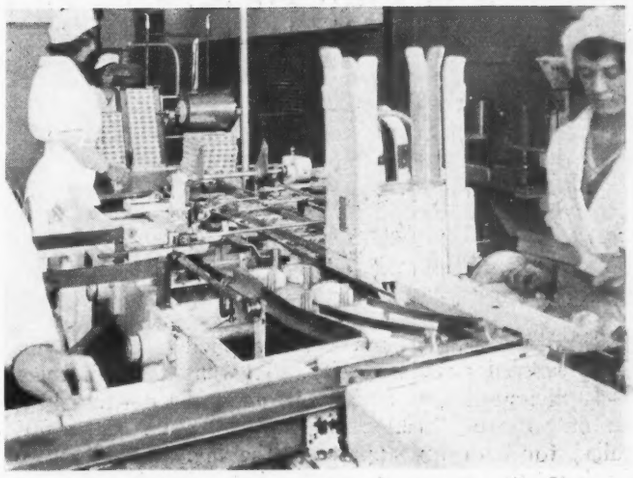


Fig. 6—Packaging and wrapping the frozen steaks. The operation is too rapid to permit any noticeable defrosting before the packages are returned to freezer storage

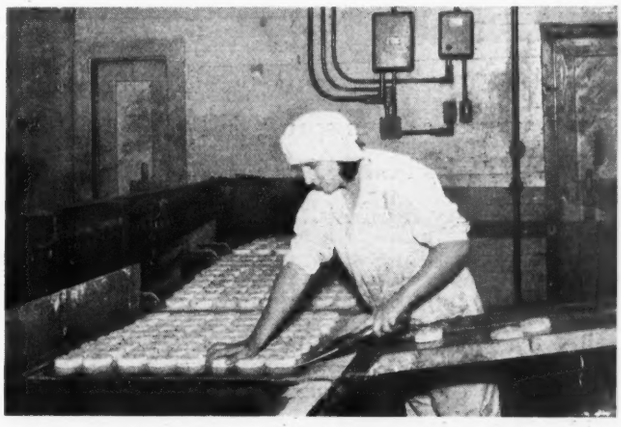


Fig. 5 — Stripping the frozen steaks from the plates of the Cooke freezer, to which they adhere during passage through the freezing room. After stripping, the steaks pass on the conveyor shown at the right to pans, in which they are stored until required for packing

Girls at the end of the machine pack twelve cartons into shipping containers, which are now sent to freezer storage to await shipment, or are sent directly to silica-gel refrigerator cars.

When the frozen steak is cooked it may be placed directly in a pan or oven, or it may be defrosted. The steak, although made originally of two or more pieces, will hold together and behave as a solid piece, even after the parchment paper band is removed and it is in the defrosted condition.

Fig. 4—Freezing the steaks by the Cooke system. Brine underneath the plates, at —20 deg. F., freezes the steaks in 36 minutes

CONTINUOUS ROASTING

Of Cacao Beans

By GEORGE DEFREN

Consulting Chemist,
Newton, Mass.

THE continuous roaster, as applied to cacao beans, evolved as a necessity. It went through many vicissitudes, as such items generally do, mainly as an outcome of "trial and error." While "necessity" called for a drying apparatus, the logical development produced the continuous roaster, but only when the fundamentals and the relationship between drying and roasting cacao beans had been developed as a mathematical proposition, as already pointed out in a previous article (FOOD INDUSTRIES, 2, 248).

Improvements in manufacturing equipment or processes seldom spring full-fledged from the inventor's brain. Rather, such advances are generally the result of cut and try methods and frequently the experience, training, and judgment of several men are necessary before the complete device or procedure is available in a commercially workable form. Mr. Defren's account, given on these pages, of the development of the continuous roaster for cacao beans is a good example of how manufacturing advances are frequently brought about through the co-operative efforts of many men and through the use of technic developed in another industry.

In the course of removing bitter and undesirable principles from raw cacao beans (see FOOD INDUSTRIES, 2, 499) the beans were left with a large percentage of water, which had to be removed before the benefits of roasting could be attained. The wet beans ferment, or become moldy, very easily, and drying was a necessity. No tropical sun being available, artificial drying was the only logical next step in the process. My experiences in the malting and fermentation industries were called upon. In the manufacture of malt, the germinated "green malt," containing a large percentage of water, is dried in one of two ways: by a stream of heated air being forced through the wet grain on floor kilns, or into the drums in which the germination of the malt had previously been developed. A drum dryer was therefore suggested and built for this purpose, but never utilized—not that it would not accomplish its purpose but because another piece of equipment was developed.

While the drum dryer was under construction, Baylis M. Dawson, a confrere on the technical staff interested in the problem, suggested using a vertical rectangular tower dryer, made up in sections of sheet iron, the wider sides of which were liberally perforated to permit the passage of heated air. Sloping shelves were placed therein and baffle plates were attached to the outer sides of this rectangular tower, the whole being then incased in another sheet-iron shell, properly insulated with asbestos. The beans were fed in at the top, and slid down by the action of gravity from shelf to shelf until they reached the bottom. On this downward journey they were subjected to a current of heated air passing upward, which was deflected back and forth, by the baffle plates, through the perforated walls. It was found afterward that a somewhat similar type of apparatus had been in use for some time for drying wet grains. Arriving at the bottom, the beans were withdrawn by an endless belt to a cracker and fanner, where they were winnowed, the dried shells being removed.

The first apparatus required immediate changes. The heated air blew out at the bottom, instead of working upward through the beans. I suggested that a "dead space" at the bottom of the tower, made of non-perforated sheet iron, the height of which, as filled with beans, to be greater than the cross-section of the tower, multiplied by the number of times the air was deflected through the beans. The "dead space" forced the air to travel upward, countercurrent to the descending beans, and ultimately we withdrew good dry beans from the bottom of the tower. The equipment was designed as a continuous dryer, and it accomplished its purpose when sufficient hot air was available.

I visualized the possibility of magnifying the dryer into a roaster, and suggested this adaptation, which was carried out. It was at this stage of development that the mathematics of drying and roasting came into play for, by increasing the quantity, or temperature or both of the heated air, the dried beans became roasted beans. Incidentally, the "dead space" functioned in the same manner as closing the draughts in the final process of the kiln-drying of malt. The grain, or beans, were in an atmosphere of non-moving hot air, "stewing in their own juice," if we may use the expression; or, in other words, "roasting." I also suggested cooling the beans quickly by drawing air from the room through the hot beans as these emerged from the base of the tower on an endless woven wire belt, or apron. The air, warmed by passing through these hot beans, was then forced through the heater, and helped to dry and to roast the downcoming beans.

The above reads well and sounds very simple. It developed, however, that the beans were not roasted uni-

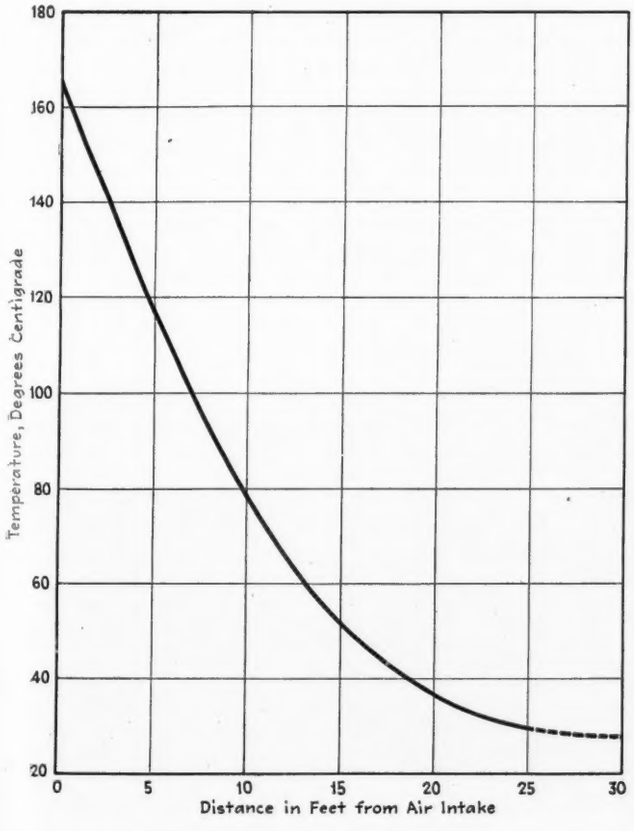
formly, due to the fact that some beans traveled downward faster than others, consequently having a shorter contact with the heated air. At the critical temperature of roasting, when but little moisture remains, the element of time becomes an important function in the mathematics of roasting cacao beans. The beans at the ends of the rectangular tower traveled slower than those in the center of the stream, due to friction. When the beans, emerging from the center of the apparatus at the base of the tower, were roasted to the desired degree, those at the edges of the belt were over-roasted, etc.

The difficulty was overcome finally by F. W. Blake, another member of the technical staff, whose genius developed the perforated double concentric cylindrical tower now in use. The shelves in the earlier apparatus were eliminated, as it was found that the beans slid downward, and did little rolling, as had been anticipated. The principles of the deflecting baffle plates; "dead space" at the bottom of the tower; the woven wire belt, with the attending bean-cooling and air-preheating systems after withdrawing the beans from the tower, were retained in the new apparatus. Many minor details also were added, such as the method of feeding the beans into the top of the tower; hand holes, or openings, at the base of each section for removing any accumulating dust from minute broken cacao shells, etc., were inserted; differential gearing to regulate the withdrawal speed and depth of the beans on the endless woven-wire belt, which is supervised by an operative who watches roasting conditions, and so on.

The present equipment is designed to utilize air heated by burning oil. I have successfully roasted cacao beans, however, by air heated by steam radiators. The most economical method of heating would be to utilize the waste heat from the flue gases, properly handled.

A graph is included indicating temperature conditions within the apparatus, using raw beans for the test roasting. Higher or lower temperatures at the intake, a high or low roast, or differing types of beans necessarily will give different material values to such a graph. It will, however, be noted that this graph, taken in conjunction with the one on roasting cacao beans (Food Industries, 2, 248), called the "roasting curve," indicates that the actual "roasting" of the cacao beans in the apparatus described above progresses within a very small area, especially within the so-called "dead space" at the base of the tower, or stack roaster. As a result, very little aromatic odor escapes from the roasting beans, to be distributed over the immediate neighborhood, in marked contrast with the usual methods of drum roasting.

Curve showing air temperatures in continuous roaster at varying distances from the air intake



As drying and roasting cacao beans are functions of time and temperature, it will be appreciated that the capacity of this equipment is very elastic, and that it can be easily made to dry or roast a large tonnage of beans daily with a minimum of labor. One man could easily run a battery of these tower, or stack, continuous roasters if some minor modifications were adopted. One apparatus, as now functioning, roasts from 900 to 1,000 lb. of raw cacao beans hourly. An inspection of the accompanying graph indicates that this capacity could be increased appreciably.

The apparatus is described as a "continuous roaster," and that is certainly the correct name for it. To be most efficient it should be operated continuously, day and night, just as conches are operated.

Raw, or processed, beans are fed in at the top at the same rate as the finished, roasted beans are withdrawn from the bottom of the equipment.

It will be appreciated that the beans, etc., passing through this apparatus leave it as clean as when they enter. This is due to the fact that they do not come in contact with any superheated metallic shell, as is the case in the ordinary drum roasters in vogue at present, which necessarily carbonize some of the shells and pulp adhering thereto, producing soot and other waste products.

Another important asset of the apparatus is the fact that working conditions for the operator are improved immensely. No "sweat-box" conditions can appear, for when the roaster is properly lagged with insulating material practically all of the heat applied goes through the beans. Roasting cacao beans has become a "white-collar" job.

The continuous roaster, naturally, is applicable to other items than cacao beans; for instance, almonds, or other nuts. It certainly also is a good dryer and could easily be modified for many purposes, such as the commercial production of various types of malt.

The above is an excellent example of what team work can accomplish when technical knowledge and ingenuity, backed by facilities, co-operate.

I am impelled to state that, while the continuous roasting of cacao beans as outlined is a big advance in the chocolate industry, it should not be construed as the last word on the subject. As roasting cacao, i.e., the production of the characteristic chocolate odor or flavor, is fundamentally based on mathematical considerations, any other process which applies these concepts further would be even more efficient. Such a development has already been accomplished.

CONTROLLED DISTRIBUTION

Insures Freshness of Retail Stocks

By FREDERICK BEERS

President, National Biscuit Company
New York City

As Told to O. Fred Rost

TRACING its history back to the days when individual biscuit bakers supplied biscuits, crackers, cakes, and similar products to those, in their immediate neighborhood, the National Biscuit Company has succeeded in building up not only the largest business of its kind in the world but also one of the most efficient distributing organizations. Singularly conservative in its policies, the record of expansion which has eventually placed the company in the position of unquestioned leadership shows that extensions into the new territory and new fields came as the logical natural result of healthy growth and were entirely void of the spectacular.

FREDERICK BEERS

Nevertheless, the story of National Biscuit's distribution as related by Frederick Beers, its president, has its dramatic element in that it reflects throughout the definite purpose of getting the products to the consumer in prime condition.

"It would be difficult," said President Beers, "to explain our methods of distribution until some of the underlying conditions in the industry are understood and a brief background is provided.

"In dealing with the manufacture and distribution of a food product such as biscuits, crackers, bread, and the like, we are at the same time dealing with what is perhaps one of the most indispensable items of food, and consequently every householder has a rightful interest in its quality, freshness, and price. The manufacturer who brings out a new novelty or patented article of one sort or other merely needs to decide the channels through which he prefers selling, and no one dares attack his right to decide or question his judgment. Vastly different is the situation where a food product is concerned; public health, public welfare, to a certain extent public policies and even generation-old habits and traditions must be considered when a plan of distribution is under scrutiny.

"Furthermore, because of the almost universal and perpetual market that exists for biscuits, crackers, bread, and other bakery products and the comparatively small amount of capital required for anyone to engage in the business of baking, at least up to within the last decade of the nineteenth century, hundreds and thousands of small bakeries had come into existence. They produced baked foods in a variety of ways with very little, if any, sanitary control of surroundings, had practically no control over uniformity of their product, and they sold what

they made wherever they could and on whatever basis enabled them to make a living. There were no standards of quality, no standards of purity, no supervision of processes, of waste, of the finished products except such as each individual producer was willing to himself impose.

"In a few sections of the country these individual bakers organized themselves into associations, but little if any attempt was made to create some definite standards of production and place the industry on a firmer foundation.

"About the year 1890 a group of Eastern capitalists purchased some of the larger bakeries along the Atlantic Coast and organized the New York Baking Company. This step caused members of the bakers' association operating in states to the west to feel that for their own protection they would have similarly to organize, and so they created the U. S. Baking Company, which was shortly followed by the American Biscuit & Manufacturing Company in the still further western states, and eventually the National Biscuit Company in the extreme West.

"At the time when the series of companies was organized, each of course by a different group of interests, distribution of their products took place chiefly through jobbers in the various distributing centers, while in the larger cities huge horse-drawn wagons visited the various retailers and supplied their requirements in the line direct from the stock carried in those wagons.

"These wagons were owned by the individuals operating them, who bought the products from the bakeries and sold them to the retailers for their own account, thus constituting actually the first group of wagon jobbers in the industry. To cover the country districts several biscuit companies employed salesmen who took the orders of the various storekeepers and some of the goods would be delivered by freight or express.

"Believing that the standard of quality of the various products could be materially improved and the final cost to the consumer reduced through consolidation of the production and distribution facilities of some of the companies then in the field, capitalists in 1898 formed the present National Biscuit Company. Included in the original consolidation were the New York Biscuit Company, U. S. Baking Company, American Biscuit & Manufacturing Company, and National Biscuit Company of the Pacific Coast. Numerous independent bakers also were acquired simultaneously to cover the field more completely and stabilize the sources of supply for the various territories. (Subsequently the F. E. Block Company, of Atlanta, Ga.; Iten Biscuit Company, of Omaha, Neb.; The Shredded Wheat Company, of Niagara Falls, N. Y.; Christie, Brown & Company, Ltd., of Toronto, Canada; Pacific Coast Biscuit Company and Bishop & Company of California were added to broaden the line and improve the company's ability to give service to its customers.)

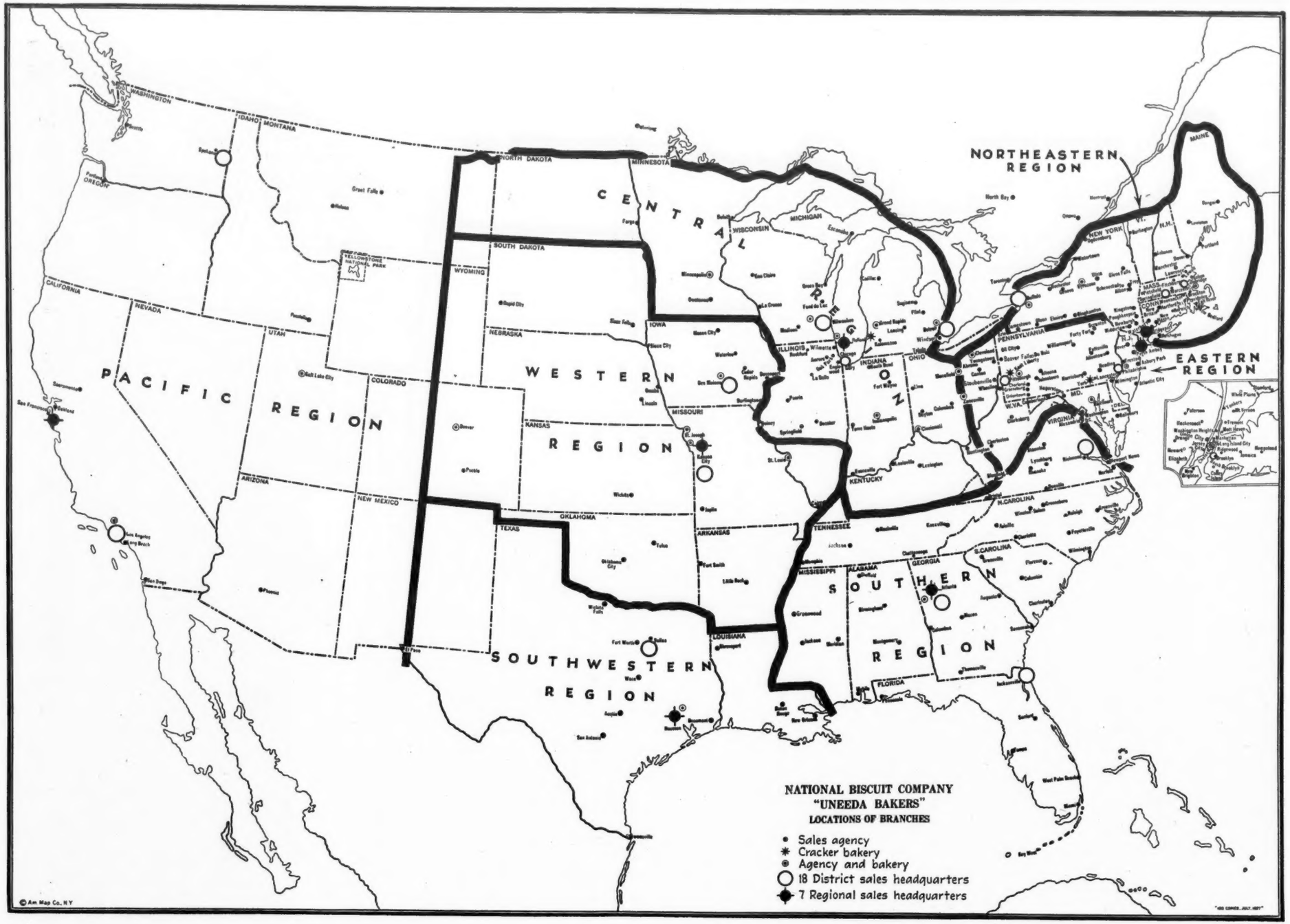
"While through this process of consolidation about 150 bakeries, numerous private brands, trademarks, and trade names came under one control, there was at that time no nationally known product or one that would lend itself to national distribution. The trademark names such as Uneeda Biscuit, Nabisco, Fig Newtons, etc., were created as products for national distribution. Today over 450 varieties of crackers, cakes, biscuits, etc., are made by the National Biscuit Company."

The system by which this vast variety of products is distributed to the retailer is unique in that it is more or less built around one fundamental result, which Mr. Beers expects from his entire organization: namely, that the product must be found fresh regardless of whether a consumer buys in a store located in Maine or Texas, in a large city or at some crossroads grocery, and no compromise is accepted on that point.

Here is Mr. Beers' story of how that system functions:

"Thinking in terms of national distribution of products that are perishable, speed becomes an important factor. We could not afford to risk the delay incurred in operating through wholesale or commission houses; consequently over 90 per cent of our output reaches

New York City bakery of the National Biscuit Company, the largest factory of its kind in existence


NORTHEASTERN REGION
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CENTRAL REGION
WESTERN REGION
PACIFIC REGION
SOUTHWESTERN REGION
SOUTHERN REGION
NATIONAL BISCUIT COMPANY
"UNEEDA BAKERS"
LOCATIONS OF BRANCHES
Sales agency
Cracker bakery
Agency and bakery
18 District sales headquarters
7 Regional sales headquarters
© Am Map Co., N.Y.

Standardized type of sales agency building used by National Biscuit Company

the thousands of retail stores direct through channels that we control.

"Our sales effort is geared closely into our distributing system, which again is organized to an extent around the respective supply base: namely, the 56 cracker bakeries and 18 bread bakeries operated by us. The general sales manager with his three assistants directs all sales and distribution.

"To obtain most economical and efficient operation we divided the country into seven regions, each in charge of a regional sales manager. These seven regions are subdivided into eighteen districts, which in turn direct the activities of 245 sales agencies. These 245 sales agencies were placed in strategic locations to insure promptest possible delivery of products into the stocks of the retailer.

"The buildings are of special design to facilitate quick and efficient handling of stocks, while in effect each constitutes a separate unit of business. The sales agent is in absolute charge, controls his sales force, trucking equipment, inventory, credits, and collection. We demand that every retailer be visited at least once each week and salesmen are trained to assist dealers in handling their stocks, making certain of its freshness, promoting selling, and store as well as window display. Salesmen are expected to hold at least three sales promotions in their territory each month.

"Actual physical distribution of our products is effected through a fleet of trucks, each covering one of 2,543 definite routes on regular schedule."

Knowing that the National Biscuit Company has found a practical method to obtain nation-wide dependable truck delivery, Mr. Beers was urged to explain the plan. This is how it works:

"Orders are delivered on those 2,543 routes by delivery men who own their own trucks, but are under contract to us and function in every way as our employees.

"A delivery man is permitted to buy any make truck he desires, subject, of course, to our approval. We merely suggest the size of truck and body most suitable to the requirements of the territory to be covered, but insist that it be painted in National Biscuit Company's standard design and color.

"If requested to do so, we readily assist the delivery man in financing his purchase. Compensation for truck service and mileage is provided for in the contract. Insurance of trucks is covered by our company's blanket policy and the delivery man even has the benefit of our company's employers' insurance plan.

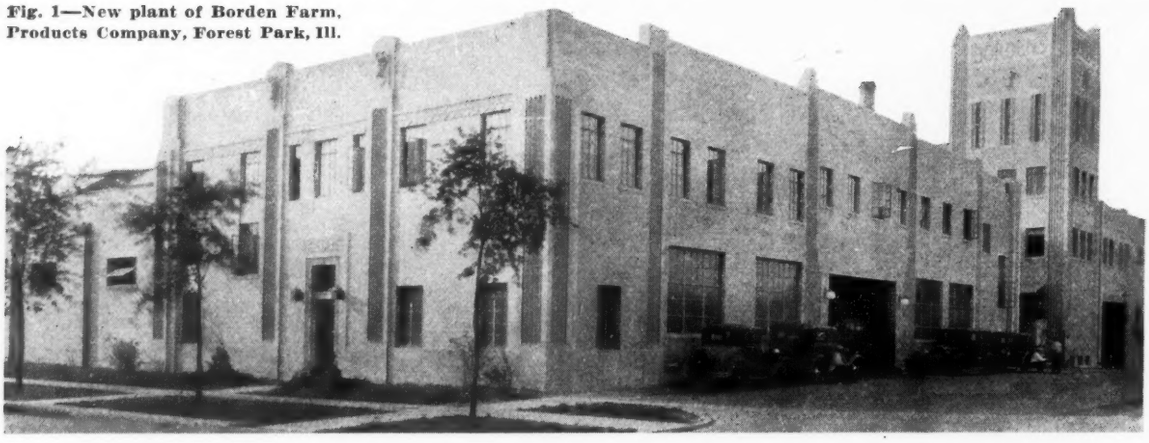
"You can readily see that under this system we obtain the best type of delivery service, with every man interested in covering his route dependably, and maintaining his truck in prime condition for economical and profitable operation.

"It is through this system of controlled sales effort and controlled store-door distribution that we have been able to achieve certainty that the product will reach the hands of the ultimate consumer fresh and in prime condition. On the other hand, complete records on consumption of the several hundred products in the respective territories of each agency enable us to gear production with infinite accuracy to the known ratio of consumption. Likewise, control of distribution makes it possible to send goods forward on their way to the retailer's shelves knowing that they will reach there practically oven-fresh."

It seemed that a company selling direct to thousands of retailers would find the matter of credit and collections one involving much expense and serious losses. However, when this thought was expressed, Mr. Beers readily explained how well that problem has been mastered.

Said Mr. Beers: "Being committed to a policy of selling direct to retailers, we undertook a process of education which has been so successful that today by far the largest part of our products is paid for by the retailer when our delivery man brings the goods. We simply convinced most of the dealers that they would save themselves time, money, and annoyance if each transaction were concluded on a cash basis and so most of them now actually prefer that plan, with the result that we have practically no credit losses to absorb at the end of a year."

Fig. 1—New plant of Borden Farm Products Company, Forest Park, Ill.



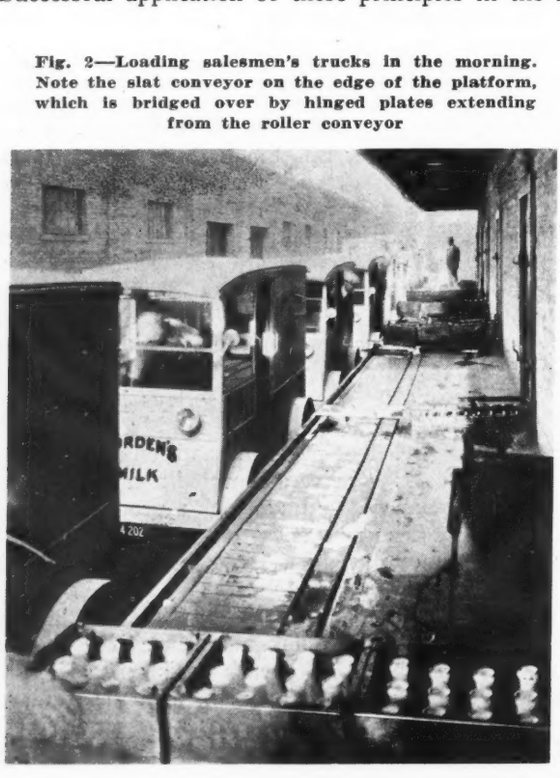
Higher Sales and Truck Efficiency Through WELL-PLANNED CONVEYORS

By JOHN M. SWANSON
Superintendent, Borden's Farm Products Company, Forest Park, Ill.

PROFITS or losses in the fluid milk industry depend today solely upon the success or failure of the concern in reducing costs of production and costs of sales through greater use of, and improved, machinery and equipment. This, however, must be supplemented by the enthusiastic and close co-operation of employees both in the plant and sales department.

Successful application of these principles in the new plant of Borden's Farm Products Company at Forest Park, Ill. (See Fig. 1), is centered around the material handling system which was definitely planned in advance of the actual design of the new building. In doing this the idea was carried out that the building should be made to house the equipment rather than to attempt to fit the equipment into a previously designed building. The latter method almost always leads to unsatisfactory results.

Fig. 2—Loading salesmen's trucks in the morning. Note the slat conveyor on the edge of the platform, which is bridged over by hinged plates extending from the roller conveyor



But before the layout of equipment for this plant could be made it was necessary to be in possession not only of detailed information on every operation but also standards of satisfactory performance—all of which represent the cumulative experience and knowledge of engineers and executives long identified with the company.

In planning the material handling system, certain conditions necessarily had to be met. All route salesmen must be able to reach their first customers, whether they are within a block or a number of miles away from the office, by 8 o'clock in the morning. This means that all trucks, of which there are more than two hundred operating from the factory branch, must be loaded and under way in the 2-hour period between 6 and 8 a.m. To maintain such a schedule, the average time for loading each vehicle must not exceed 35 seconds.

Without dwelling upon the steps by which the comprehensive plan was developed, the final design which was ultimately adopted will be presented. It is now in successful operation. Two of its phases are important: the material handling equipment, and the system of

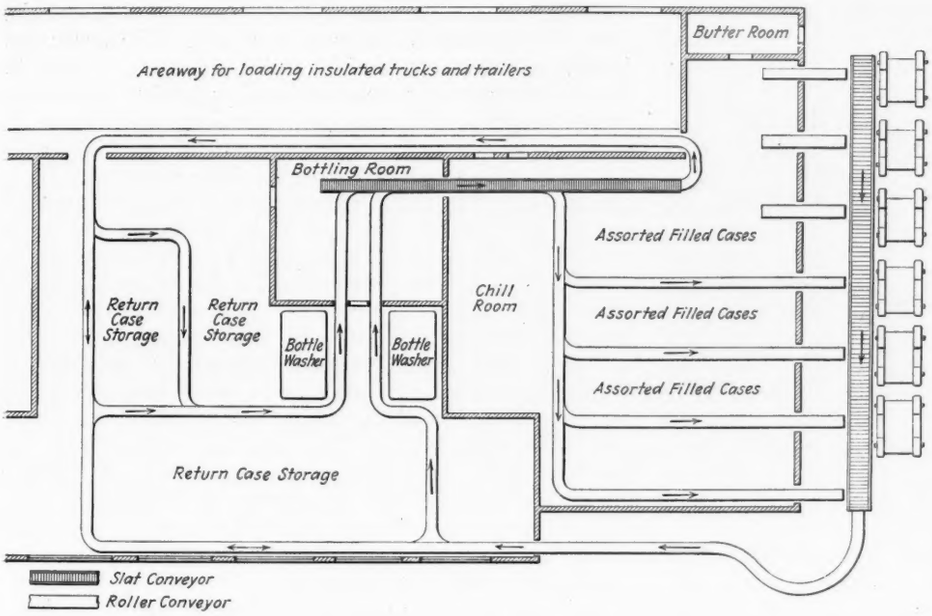


Fig. 3 — Layout of case conveyors at Forest Park

operation and control. Any large dairy is equipped with conveyors within the plant, but in the Forest Park plant the striking feature is the extension of the conveyors to the loading and unloading platform, to the end that the very edge of the platform is a conveyor (see Fig. 2).

The conveyor layout is shown in Fig. 3, in which its direction of movement is indicated by arrows. It must be remembered by those outside this branch of the industry that a dairy plant has a double handling problem. Cases of filled containers must be shipped out in the morning, and later in the day an approximately equivalent number of cases and empty containers must be returned for washing and filling. Roller conveyors in the chill room are equipped with hinged plates at the platform end and bridge across the slat conveyor when they are being used for loading out the delivery trucks in the morning, as shown in Fig. 2. When empty bottles are being returned in the afternoon the plates are turned back out of the way and the roller conveyor is pulled back into the chill room. The slat conveyor along the edge of the platform is used, as shown in Fig. 4, for taking away returned bottles.

The whole layout is planned for cutting down unproductive time of route salesmen at the plant, thereby giving them as much selling time as possible. Other advantages gained by this layout are freedom from traffic congestion at the plant, economy of operation, and accuracy of checking the route salesmen out and in.

Of an importance almost equal to the equipment itself is the routine or system of operations to be followed, particularly in the early morning, when there are two hours of great activity. At that time confusion and delays might affect either the entire organization or possibly only those who have not yet gotten out on the street with full loads.

All trucks are stored in the garage shown in Fig. 5 where the electric trucks, the backbone of the fleet, are recharged every night. When the route salesman reports for work in the morning he drops the number of his route into a slotted blackboard which indicates his place in the rotation for loading out. Salesmen who must travel considerable distances to reach their first customers will be among the earlier arrivals. After dropping his number the salesman goes to his own truck, which always stands in the same location. Because the loading platform has six loading points, the trucks move out in groups of six. A mechanic in charge of the garage calls out six numbers in the order in which they have been deposited in the slotted blackboard. The salesmen then drive out into the center aisle of the garage and form a line. All crowding or jockeying for place is thus elimi-

Fig. 4—Unloading salesmen's trucks in the afternoon. The roller conveyors are pushed back into the chill room and the slat conveyor is brought into service

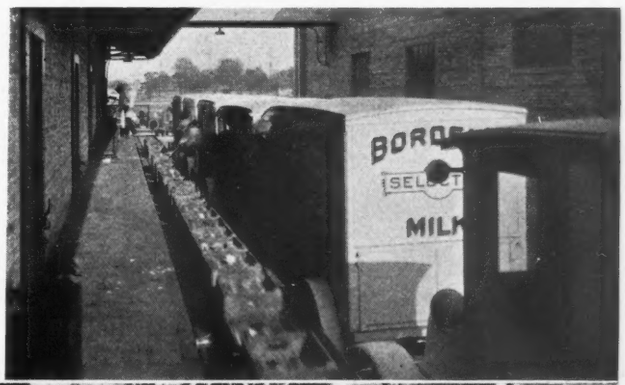
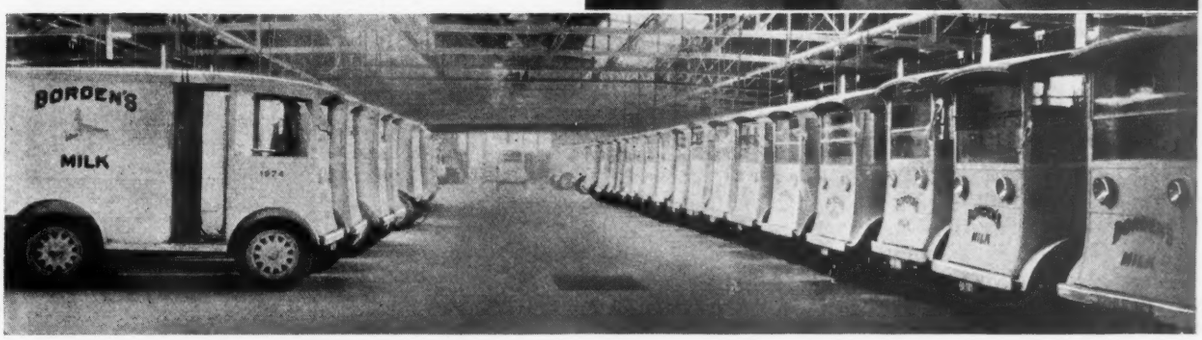


Fig. 5—The garage is exceptionally large



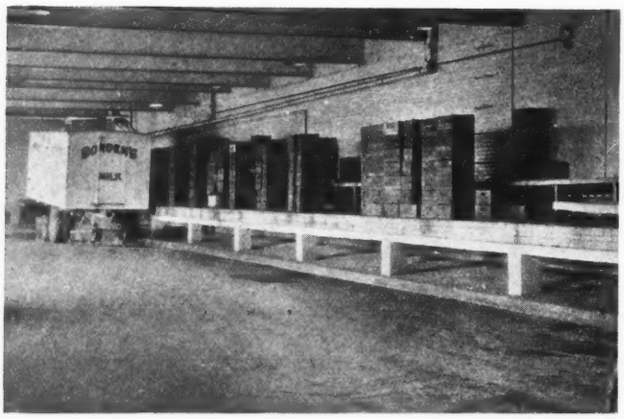


Fig. 6—The loading platform in the areaway is also equipped with roller conveyor

nated, and the line is formed continuously and moves forward to the loading platform.

On arrival at the loading station the salesman calls out his number to the man inside the chill room who immediately places the order for that route number on the roller conveyor. This procedure is followed no matter at which door he may stop, and is possible by having posted at each loading conveyor a duplicate of the consolidated order sheet showing exactly what items every truck is to take. This feature is highly important, for without it the time-saving features of the conveyor system would be largely lost.

The consolidated order sheet is made up at night from the orders turned in by route salesmen and is duplicated the requisite number of times for posting at every point in the plant where it is necessary to know these figures. It shows the number of cases of quarts, pints, and half pints, and the grade of milk or cream; buttermilk, cottage cheese, and the like which are to go out on each route and is an extremely important feature in facilitating loading in the 35-second average period per truck.

Each truck also stops at the last conveyor, next to the butter room, for its order of butter, eggs, cheese, and the like, which is rolled out to it in a case. The order has been put up during the night and is located on a shelf in the butter room over the route number, so that on hearing the route number the man inside can fetch it instantly.

For unloading and garaging the returning vehicles only 15 minutes is required for each. The roller conveyors that were in use in the morning are moved back out of the way. The slat conveyor is in operation, the route salesman sets off all his cases onto it, and then drives to the garage. Before getting into line, however, the salesman has placed in each case of bottles a colored card on which is stamped the number of his route. This color scheme, which is of material assistance to the person compiling the records, calls for a green card for quart bottles, pink for pints, white for cream bottles, and yellow for stray bottles. The latter are bottles belonging to other dairy companies, which are returned to their owners through the medium of a central bottle exchange.

The cards are collected from the cases by one man inside the plant, who sends them to the checking room for crediting to the route salesman.

Returned cases are conveyed directly to the washers, where the bottles are loaded into the machine and the cases continue on through the case washers and meet the clean, filled bottles at the fillers. From this point they move on conveyors to the chill room or to vans for transportation to other branches (see Fig. 6). In the chill room the cases of milk, cream, or buttermilk are stored alongside each of the six loading doors until loaded out next morning.

The basic philosophy of the material handling system is to keep everything moving until the returned bottles have been washed, sterilized, filled, and placed in clean cases ready for loading out. A further extension of the conveyor principle is found in the supply rooms. New bottles received in crates, new cases, and other supplies purchased in car lots are automatically conveyed to the second floor for storage and subsequently conveyed to the production department when required.

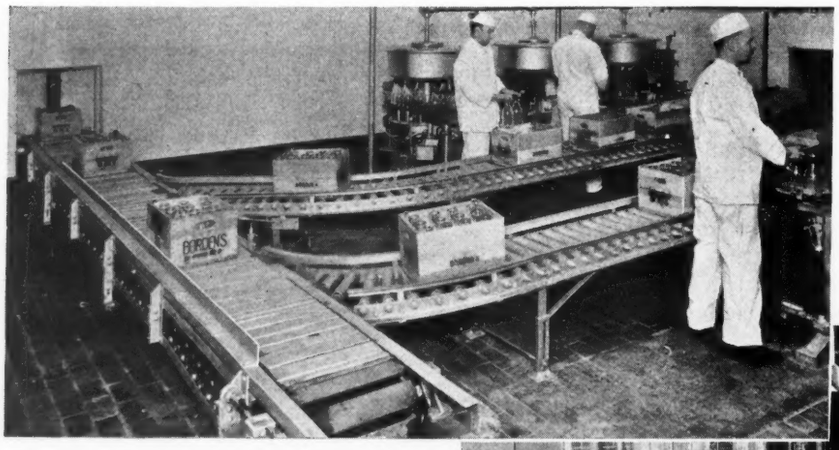
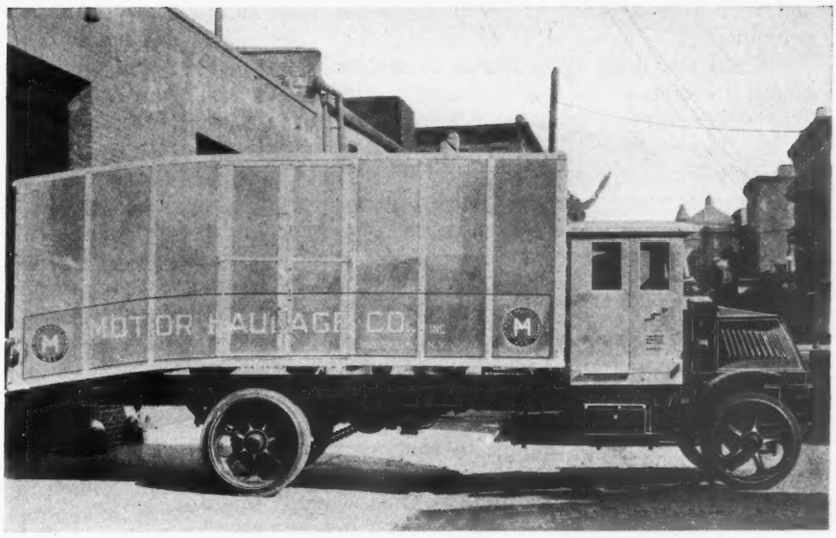


Fig. 7—Left: Case conveyors in the filling room

Fig. 8—Right: Dirty bottles coming into the washers



This aluminum body weighs 2,930 lb., while a body of wood and wrought iron of the same size and capacity weighs 3,920 lb. The difference is the increase in pay-load capacity given by the lighter body

Hidden Profits in TRUCK OPERATING ECONOMIES

By F. E. SPOONER
Maplewood, N. J.

DELIVERY expense has an important bearing on the final cost of any commodity. In addition, and most important, delivery cost is intimately connected with the profit account. Not infrequently, a 10 to 15 per cent reduction in the cost of the delivery department will have the effect of doubling the net profits. The importance of this department is further emphasized by the fact that its cost often ranges from 20 to 35 per cent of the total operating cost. This large portion of any business should receive most thoughtful attention.

Use of proper vehicle equipment, installation of modern methods, continual education of the driver, and general application of scientific management to the vehicle department will reduce the cost of delivery.

Economy does not necessarily imply the use of less costly equipment or lower-paid personnel. True economy is attained by organizing the fleet of trucks so that each vehicle will give 100 per cent performance and not engage in work for which it is not suited. Too many trucks are running with only partial loads; too many trucks are in operation that should have been scrapped.

Motor truck efficiency depends upon three factors: operation, maintenance, and economy, each of which is a summation of a number of lesser factors.

Operating efficiency aims to get the most out of the equipment. It represents the prime purpose of the truck: that of carrying a load over a distance in a given time. Operating efficiency is determined by the moving and load factors. The more the truck is kept moving under load and the more productive the load, the greater is the efficiency.

The moving factor depends upon six sub-factors: waiting for loads, loading and unloading delays, clerical delays, loafing, and traffic delays. The more each of these can be reduced, the greater this factor will be.

Loading delays frequently can be reduced by a change in loading method. This may be done by modifying the truck equipment or by changing the extraneous truck loading equipment. In the former, demountable bodies, semi-trailers, or four-wheel trailers may affect the result desired. In the latter, special equipment such as overhead chutes, cages, or greater efficiency of shipping force may decrease delays.

Unloading delays usually will be remedied by the same processes used in relieving loading delays.

Lost time can also be traced to clerical inefficiency. Quicker work can be accomplished by the introduction of modern mechanical office appliances or by reorganization of the present clerical force.

Loafing is another source of delay. In large fleets this is checked on the road by inspectors or by the use of appliances that are designed to show truck movements.

Traffic delays, while individually small, in the aggregate form a period of time worth saving. While traffic delays usually are beyond the power of the operator to remedy, there is the possibility of instituting route control so that the trucks are not sent out over the most congested thoroughfares.

The load factor depends upon four sub-factors: body capacity, load density, special deliveries, and trailers.

Body capacity will depend upon the goods to be moved and the rated capacity of the truck. Failure to keep the body capacity in line with the load rating furnished by the truck chassis manufacturer will in most instances account for unprofitable operation. If the full load carried is too light—an uncommon occurrence—then the delivery cost per package will be too large. If the load (body, cab, chassis, and merchandise) exceeds the rated capacity of the truck, then frequently the saving in the cost per package is more than made up for by the losses due to premature tire wear and the additional strains placed on such wearing units as bearings, axles, frames, etc. It is possible to gain extra payload capacity through the use of lighter bodies made of such materials as aluminum; in fact it is possible to save from 40 to 60 per cent by discarding wood and steel construction.

Special deliveries with heavy-duty trucks are expensive

and should be avoided or should be made with special equipment.

One of the primary purposes of the trailer is to increase the capacity of the motor units—to increase each load without proportionately increasing the cost. Elimination of idle time is another trailer advantage and is accomplished by the relay system of carrying. This system permits one or more trailers to be loaded while another is in transit. The conditions warranting the use of the relay system, of course, do not exist in every industry, but when they do, its use generally renders transport more economical. By relieving platform congestion, trailers allow the establishment of steady work, which in turn permits reduction of shipping-room personnel and checking costs. In addition, trailers do not require as much loading and garage space as motor trucks. This is an advantage in congested quarters and reduces overhead. Also, increased load capacity permits longer delivery routes per trip. Thus, when properly installed, trailers result in a reduction of operating costs.

Efficient maintenance is the means whereby operating efficiency is maintained continuously instead of occasionally. Maintenance efficiency depends upon the ratio of working to laid-up time.

Opinions differ as to the best method of accomplishing efficient maintenance. One method that has been advocated is a general overhauling at stated periods. Another is the unit-repair system by which units, such as the engine, the transmission, or the differential, are repaired after certain mileages. Yet another system advocates continual maintenance with periodical visits to the shop for a general going-over.

The last method seems to be most generally accepted, because it has a very important bearing on the economic life of the unit. In operation, this method of maintenance is based entirely on a "stitch in time" policy wherein rigid daily inspections bring to light the need for minor repairs and adjustments that might later develop into shop work of a major character. As a result, it is possible to keep the trucks almost continuously in excellent mechanical condition until they are retired through obsolescence or other natural causes.

Economy in the repair shop takes into consideration such points as reduction of stock inventory, shop cleanliness and arrangement, equipment, salvage, and adoption of an efficient accounting system.

It will be found that by working more closely with the truck manufacturer and by adhering to his recommendations, more satisfactory maintenance and vehicle performance can be secured. With complete mileage in maintenance records available, it is possible to inform the manufacturer when a part fails and of the nature of the use to which it has been subjected. The manufacturer is then in a position to know whether the part is inadequate, unsuitable or defective, or if it has failed because of misuse; and when given such information he usually is willing to render any assistance possible. Many serious errors have been avoided by seeking the manufacturer's advice before changes are made.

Adoption of efficient maintenance accounting systems will materially decrease man-hours and should indicate immediately any inefficiency in the performance of work which produces excessive labor cost. Faulty practices thus can be remedied or discontinued.

Thus far, no mention has been made of the driver or of the garage, and yet they are equally important factors in influencing the output of the truck fleet and of the individual vehicle.

The driver, whose salary or commission is the largest single item of expense, is a most important factor. On him depends not only the proper operation of the delivery system but to a large extent the very success of the business. He is the company in the eyes of the customers.

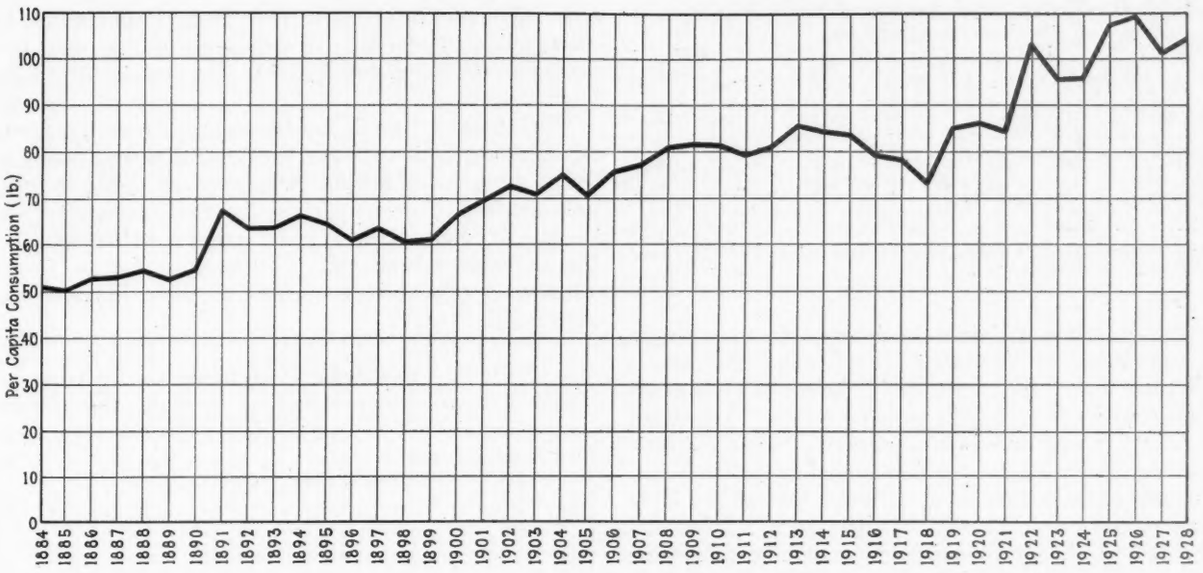
The driver has a further responsibility to the company he represents. He must effect the delivery of his products in the most economical manner. He is more responsible for the economical operation of his vehicle than the mechanic who makes the repairs. He is the one most thoroughly acquainted with his truck. He is giving it a continual road test and should know its every failing. Properly reporting these failures to the man in charge of the mechanical upkeep of his vehicle is an important phase of his work for the realization of economy.

There is no greater incentive to spur on the efforts of the worth-while driver than to compare him with his fellow-worker. This may be accomplished by a simple periodical publication of records of performance or the granting of a cash bonus. This latter should depend partially, at least, upon the mechanical economy of the vehicle. Both methods have been worked with success. Drivers can also be stimulated to greater effort for economy by showing them concretely what stated savings per day in delivery costs mean in terms of profits on sales.

Economy in the garage takes into consideration its layout for speedy egress and ingress of the vehicles during the rush periods of the day. Traffic jams inside the garage are quite possible and should be avoided, especially in the morning, when the trucks must get to their loading platforms on scheduled time. The avoidance of pillars and other restricting factors to the speedy movement of the vehicles is imperative. The vehicles should be fueled immediately after the vehicles come in at night. Likewise the vehicles should be washed as soon as possible after the evening arrival, thereby eliminating as far as possible the need for moving the vehicles about in the garage.

In conclusion, accurate records can be kept to cover all of the foregoing points. It is only on the basis of such records that accurate control of trucking costs can be accomplished.

Three trailers in loading position at a bakery. While these are being loaded the tractors can haul other trailers, thus cutting down idle time of motors units and evenly distributing loading time



PER CAPITA CONSUMPTION of refined sugars in United States
—From Willett and Gray statistics

Important Factors in

SUGAR CONSUMPTION

By E. G. MONTGOMERY
Chief, Foodstuffs Division
U. S. Department of Commerce

CONSUMPTION of sugar has increased steadily for the past half century, the rate having been slightly accelerated in recent years, as shown by the accompanying chart. It would be very interesting to know in just what way people have increased their use of sugar, as it is not used directly as food, but largely as flavoring or in connection with the preparation of other foods, such as baked goods, confectionery, beverages, and ice cream.

No comprehensive study has ever been made which reveals the exact distribution of sugar in the various industries or discloses just how much the household consumption now is. A survey in 1901 by the U. S. Bureau of Labor covered 2,567 families of workingmen located in various parts of the country. This survey disclosed that in the average working man family, the per capita household consumption was about 50.5 lb. In contrast was the indicated total per capita consumption of that year, shown by Willet and Gray as 69.7 lb. It appears, then, that 30 years ago approximately 72 per cent of the United States sugar consumption was for miscellaneous household purposes, and that 28 per cent went through other channels.

The statistics of the Bureau of Labor are in general confirmed by the U. S. Sugar Equalization Board report of operations during the World War period. That agency concluded that industrial consumption was approximately one-third of the total. The third estimate, by B. W. Dyer, of New York, indicates that for 1928 66 per cent of the 110 lb. per capita went to direct household application, and the balance to industrial uses.

The food manufacturing and processing industries unquestionably are the largest users of sugar outside the household. The baking industry probably consumes the most, apparently using about 10.5 per cent of the sugar of the nation. The candy industry is next in rank, using 8.2 per cent, followed in turn by beverages, ice cream, hotels and restaurants, condensed milk, and canned goods. During the recent tariff hearings one estimate was presented in behalf of the National Confectioners' Association saying that about 390,000 tons of

Table I—Sugar Consumption in United States

Year	Total Consumed* (Tons 2,240 lb.)	Per Capita of Population	Percentage Change from Previous Year
1929	5,810,980	108.13 lbs.	Increase 4.842
1928	5,542,636	104.27 lbs.	Increase 4.636
1927	5,297,050	100.95 lbs.	Decrease 6.600
1926	5,671,335	109.30 lbs.	Increase 2.927
1925	5,510,060	107.50 lbs.	Increase 13.505
1924	4,854,479	95.90 lbs.	Increase 1.544
1923	4,780,684	95.63 lbs.	Decrease 6.128
1922	5,092,758	103.18 lbs.	Increase 23.992
1921	4,107,328	84.47 lbs.	Increase 0.555
1920	4,084,672	86.56 lbs.	Increase 0.418
1919	4,067,671	85.43 lbs.	Increase 16.365
1918	3,495,606	73.36 lbs.	Decrease 5.104
1917	3,683,599	78.58 lbs.	Increase 0.683
1916	3,658,607	79.34 lbs.	Decrease 3.759
1915	3,801,531	83.83 lbs.	Increase 1.082

For 107 years, the increase in total consumption has annually averaged 5.111 per cent.

Estimated consumption for first six months of 1930, 2,860,420 long tons refined basis, as compared with 3,009,377 long tons for the first half of 1929.

*Refined and/or consumption value.

—From *Manual of Sugar Companies*, Farr & Company, New York City; based on Willett and Gray statistics.

Table II—United States Sources of Sugar Supply

In Thousands of Long Tons

	1929		1928		1927	
	Tons	Per Cent	Tons	Per Cent	Tons	Per Cent
Cuba	3,015	51.88	2,607	47.04	2,913	54.99
Domestic Beet	857	14.74	1,037	18.71	780	14.68
Hawaii	775	13.34	683	12.33	636	12.00
Philippines	604	10.40	476	8.59	435	8.20
Puerto Rico	384	6.61	583	10.52	482	9.18
Domestic Cane	157	2.70	116	2.09	39	.72
Miscellaneous	19	.32	40	.72	12	.23
Total	5,811		5,542		5,297	

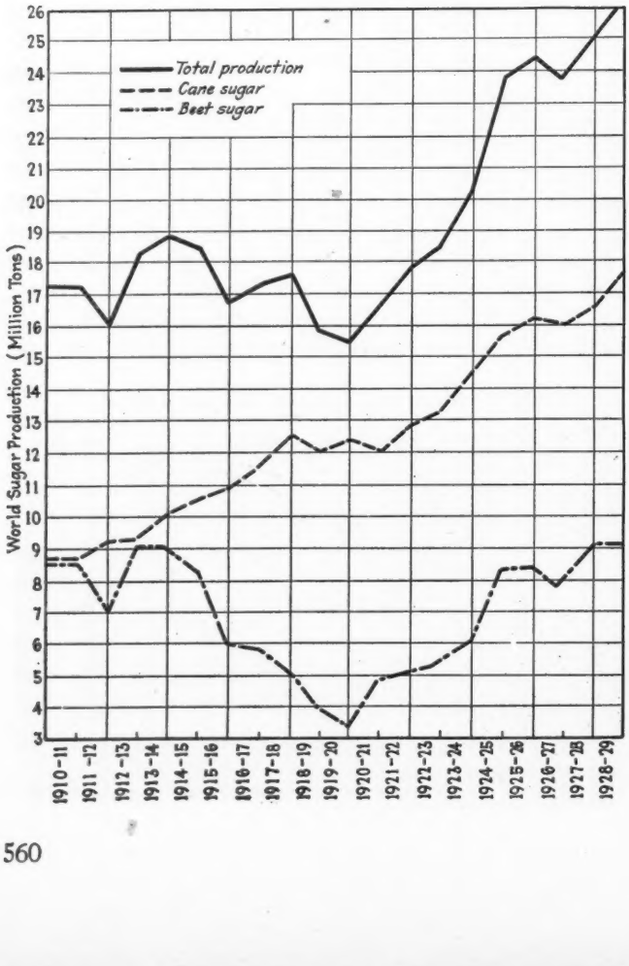
—From *Manual of Sugar Companies*, Farr & Company, New York City; based on Willett and Gray statistics.

sugar was used in activities of interest to that group. The Association of Bottlers of Carbonated Beverages, in the course of the same tariff hearings, estimated 300,000 tons as their requirement of sugar. And from these points on one finds a wide variety of scattered estimates, even down to the requirements for the manufacture of tobacco and chewing gum, which take respectively at least 25,000 and 15,000 tons per year. Even the maker of proprietary medicines must not be forgotten, as his requirements certainly exceed 6,000 tons a year, and the soap maker is another applicant for notice in this connection, with a requirement averaging 1,000 tons.

It is very easy to account for the increased consumption of sugar in the industrial field during recent years, since there has been a large development in the consumption of commercial baked goods, ice cream, beverages, and canned fruits. It is not so easy to account for the large increase in household consumption, except on the general basis that since the standard of living throughout the country has risen rapidly during the past 30 years, there must be large groups of consumers among the low-income classes that are now able to use sugar for home cooking, preserving, and canning in much more liberal quantities than they did 30 years ago. At best

World sugar production

—*From "Sugar," Series of League of Nations Publications, 1929, II, 20.*



it is only speculation as to how sugar consumption has increased, although we are very sure of the main fact: namely, that sugar consumption has practically doubled in the last 40 years.

Unfortunately, we do not have exact figures on the per capita consumption of the various commercial products using sugar in quantities 30 years ago. The only figures available for comparison are those taken from the Census of Manufactures, which express in value the output of various products. Comparative figures for the value of products in a number of these industries are shown in Table IV.

Table III—Raw Sugar Price Range for 20 Years

Cost and Freight Quotations for 96 Deg. Cuba Centrifugals—Prompt Shipment to New York. Net Cash (without duty).

Cents per Pound.

Year	High	Low	Aver.	Year	High	Low	Aver.
1929	2.3125	1.6875	2.001	1919	12.50	5.88	6.354
1928	2.875	2.00	2.459	1918	5.88	4.985	5.014
1927	3.500	2.688	2.959	1917	6.50	3.8125	5.208
1926	3.375	2.188	2.568	1916	5.625	3.50	4.767
1925	3.06	1.94	2.562	1915	4.19	2.625	3.626
1924	5.625	3.00	4.186	1914	5.50	1.875	2.745
1923	6.625	3.25	5.240	1913	2.44	1.875	2.150
1922	4.00	1.813	2.977	1912	3.44	2.41	2.804
1921	5.25	1.813	3.459	1911	4.60	2.06	3.090
1920	22.50	3.625	11.337	1910	3.09	2.44	2.828
	Average for 10 years, 3.975 c. net cash.				Average for 20 years, 3.917 c. net cash.		

—From *Manual of Sugar Companies*, Farr & Company, New York City; based on Willett and Gray statistics.

Table IV—Growth of Sugar-Consuming Industries*

	1899	1909	1914	1927
Bakery Products	$175,369,000	.....	491,893,000	1,394,700,000
Confectionery	60,644,000	.....	153,685,000	391,927,000
Canning and Preserving Fruits, Vegetables, Pickles, Jellies, Preserves, Sauces	99,335,464	.....	210,091,000	572,346,000
Condensed Milk	.....	17,345,000	21,585,139	34,251,000
Beverages (non-alcoholic)	.....	.....	58,401,000†	242,694,000
Ice Cream	.....	.....	55,983,000	301,645,000

*From United States Census of Manufactures.
†For 1914 reported as mineral and soda waters.

In one of the earlier articles of this series it was pointed out that while there had been a marked decrease in the per capita consumption of cereal products during the past 30 years, there had been a striking increase in the consumption of sugar, vegetable fats, and dairy products, the increase in consumption of these commodities almost offsetting the decrease in cereals.

Table V is a rough estimate of the caloric value of some of the principal food products, based on their estimated consumption in 1899 compared with the period 1922 to 1925. This table, of course, does not represent all the food consumed, as there are many products other than the foods listed, but the table is sufficient to indicate the general fact that the increased consumption of fats and oils and sugar to a large extent offsets the decrease in consumption of cereals so far as the relative value of foods can be measured in terms of calories.

Table V—Per Capita Fuel Value of Principal Foods

Product	1899 Pounds	1899 Calories	1922–1925 Pounds	1922–1925 Calories
Cereals[1]	350	568,750	230	373,750
Meats[2]	142	176,440	145	180,170
Fats and Oils[3,4]	34	143,480	44	185,680
Sugar[5]	61	113,460	105	190,850
Dairy Products[4,6]	451	139,810	672	208,320
Fresh Fruits[7]	169	51,210	192	58,180
		1,193,150		1,196,950
Per cent increase				0.318

[1] Cereals, averaged at 1625 cal./pound.
[2] Meats, average of all cuts, medium lean, beef, pork, and mutton as eaten—1242.5 cal./pound.
[3] Fats and oils, 4220 cal./pound.
[4] Dairy products data are reduced by the milk equivalent of the butter which is included in fats and oils.
[5] Sugar, 1860 cal./pound.
[6] Dairy products, as milk at 310 cal./pound.
[7] Fruits, average 18 varieties, as eaten—303 cal./pound.

Abstracts of Current Literature

DOES NICKEL DISSOLVED DURING PASTEURIZATION CATALYZE DESTRUCTION OF MILK VITAMINS? Avery D. Pratt. *Journal of Nutrition,* Vol. 3, p. 141; September, 1930.

Animal feeding tests have been made in order to answer this question. There was no appreciable destruction of vitamin A by pasteurization in either glass or nickel containers. The antineuritic factor of the vitamin B complex was partially destroyed by pasteurization, but there was no evidence of a catalysis of the destruction by nickel. Vitamin C was partially destroyed by pasteurization, but nickel did not seem to increase the destruction.

* * *

VITAMINS IN CANNED FOODS. IX—TOMATO PRODUCTS. E. F. Kohman, W. H. Eddy, and Celia Zall. *Industrial and Engineering Chemistry,* Vol. 22, p. 1015; September, 1930.

Vitamin C in tomatoes is apparently quite stable to heat if oxidation is avoided. Steam may be employed to avoid contact with air, so that the vitamin content will not undergo destruction which is proportional to such exposure to air. The vitamin B content of tomatoes is apparently affected by certain processes where excessive exposure to oxygen is not avoided. The vitamin A content is practically unaffected by commercial processes, but is removed with the pulp by filtering.

* * *

MICRO-ORGANISMS IN MARGARIN. Otakar Laxa. *Zentralblatt für Bakteriologie,* Vol. 81, II, p. 392-6; Sept. 4, 1930.

Occurrence of visible colonies of micro-organisms in margarin is not common, because prolonged storage is not practiced and the permissible concentration of benzoate preservative is sufficient to inhibit bacterial growth. Margarin does not, however, have sufficient immunity from bacterial attack to relieve the producer from the responsibility of taking due sanitary precautions. Indeed, there is an organism which thrives so well on margarin that its discoverer, Professor Bubak, named it *Margarinomyces.* Since his death it has been named *Margarinomyces Bubaki.* Some seven years ago, this fungus became so troublesome in hot weather in one margarin factory that the producer was forced to adopt thorough bacteriological control measures. A few years later, when these precautions began to be neglected, infestation again occurred. The organism is so resistant to sodium benzoate that this preservative is ineffective unless the permissible limit is higher than 0.2 per cent; but it is quite sensitive to boric acid and to sodium fluoride. In view of the resistance of the organism to preservatives, it is difficult to find a preservative whose permissible concentration is effective, and for this reason extreme factory precautions become necessary where infestation occurs.

* * *

NEW OLIVE OIL PRESS. Antonin Rolet. *Matières Grasses,* Vol. 22, p. 8948-50; September, 1930.

To eliminate disadvantages in the use of press bags in making pressed olive oil, the Service d'Oleiculture of France has designed a horizontal alternating double-effect press in which the press bags are not used. It accomplishes several other purposes which may be looked upon as improvements over the older type of vertical press: the oil extraction is better, with better removal of such impurities as mucilaginous matter, dirt, pulp, and the like. The press cake is more thoroughly freed from residual oil, because the new press operates at 50 to 75 per cent higher pressures than the vertical type. The operating and maintenance costs compare favorably with those of the complete equipment used in the vertical-press system. A description is given of the construction of the new horizontal press, and the method of operation is outlined.

* * *

BUTTER AS A COLLOID. Nicolaus King. *Kolloid-Zeitschrift,* Vol. 52, p. 319-32; September, 1930.

Different opinions have been expressed as to whether butter is a water-in-fat or a fat-in-water emulsion. Another conception is now presented, different from either of these: namely, that butter is a system of water droplets and fat globules in liquid fat. Attention is also called to the importance of the gas phase, introduced as fine air bubbles in the churning process. Though not large in quantity, the oxygen thus dispersed in the butter probably is responsible for the tallowiness sometimes encountered, and it also exerts considerable influence on bacterial changes. Keeping qualities of butter are said to be improved by churning it in an atmosphere of carbon dioxide. There is evidence that the continuous phase in butter is liquid fat, acting as dispersion medium both for the water and the solid fat; hence the new conception of butter structure. The other substances which are present, even though in very small quantities, have important influence on the appearance, flavor, and nutritional value. They include lecithin, cholesterin, coloring matter, and vitamins A and D. Consistency is mainly governed by the fat phase.

* * *

CARBON DIOXIDE STORAGE OF FRUITS, VEGETABLES, AND FLOWERS. N. C. Thornton, *Industrial and Engineering Chemistry,* Vol. 22, p. 1186; November, 1930.

Fruits and vegetables held in storage for three to seven days withstood, without apparent injury, concentrations of carbon dioxide varying from 6 to 83 per cent, depending upon the kind and variety tested. In every test the carbon dioxide removed the astringent flavor from the pear and banana during storage, while a bitter flavor was developed in grapefruit and oranges. Dry-surfaced vegetables were more tolerant to carbon-dioxide treatment than wet-surfaced vegetables. It is already known that storage of apples is aided by the presence of carbon dioxide, which retards the ripening process.

* * *

BAKING CHARACTERISTICS OF THE NEW SOFT WINTER WHEAT FLOUR. C. A. Glabau, *Bakers Weekly,* Vol. 68, p. 69; Nov. 1, 1930.

The ash mineral content of the new soft wheat flour is practically the same as last year, with a few exceptions in which it runs a little higher. The protein runs practically the same as the ash, from a comparative standpoint, although it is a little lower in some samples. The gluten is of good quality, being smooth with a good extensibility, and is a little stronger than the old flour. Tests included pound cake with new standard patent flour, as well as pound and angel cakes with new short patent flour.

* * *

DOUGH EVAPORATION A GOLD MINE OF REVENUE. P. G. Pirrie. *Bakers Weekly,* Vol. 67, p. 43, Sept. 6, 1930.

Loss of weight of doughs during fermentation under practical shop conditions has amounted to as much as 6 per cent, while the average loss in the plant under good control can be held down to about 0.5 per cent. Some weight loss will always take place during fermentation, but large losses due to evaporation may be prevented. Materials should be weighed accurately, humidity should be controlled—70 to 75 per cent relative humidity in the dough room is desirable—and suitable records should be kept. In one bakery, a five-oven plant, evaporation losses in the dough room were found to be equivalent to 100,000 lb. of dough per year.

◂◂ What's on Your Mind?

Still More on Thermophiles

To the Editor of FOOD INDUSTRIES:

It is quite evident from the first two columns of Dr. Cameron's letter on thermophiles, appearing on page 473 of your October issue, that I have misconstrued his position in the matter. I believe we have much in common in our mutual findings that:

> (1) thermophiles may be introduced into the canning operations by the medium of sugar.
>
> (2) proper sterilization of the brine will eliminate this source of contamination.

In this connection it is quite interesting to note Dr. Cameron's excerpt from his own writings:

> It is probable that sugar is rarely so highly contaminated as to lead to direct spoilage. It seems certain, however, that thermophilic spoilage infection may be carried by sugar and thus inoculate various units of the canning machinery, and at these points the contamination may develop to an extent where it will become a factor of spoilage.

I am happy to hear such coincidence of viewpoint. I think we can quite rationally feel that any source of contamination, no matter how slight, may become extremely troublesome when the contamination is introduced into conditions favorable to the growth of the organism. Such reasoning is also directly applicable to spoilage organisms introduced from whatever source, be it the raw product, soil, water, or any other. When these organisms are introduced into wooden tanks or machinery the danger multiplies enormously.

I can now refer directly to the bulletin, "Bacteriological Field Studies in Canning" (Bul. 25L, Washington, July, 1928), by Messrs. Cameron, Williams, and Thompson, wherein the authors report finding thermophilic spoilage organisms to a smaller or greater extent in corn (pp. 28, 29), peas (pp. 39, 42), blanchers (pp. 9, 18, 32, 34), water (pp. 26), sugared brine (pp. 15, 16, 19, 20, 21, 23, 24, 27, 34, 38, 42), wooden tanks (pp. 10, 11, 16, 21, 32, 33, 34, 35), and manure (pp. 38, 39). The preponderance of references to sugar here, as against the preponderance of specific examples cited here and elsewhere, which showed how the contamination problems were corrected by the replacement of wooden tanks and by the proper care of blanchers and washers, naturally led to a misunderstanding of just which factor was considered the more important.

The above citations are sufficient evidence to show that there are many other sources of contamination besides sugar. It is further quite evident that the amount of contamination introduced into any system may be of quite insignificant importance compared to the conditions of growth which the organisms meet in the system. A slight infection under suitable conditions can cause a much heavier contamination than thousands of spores under less favorable circumstances. It follows directly that a few thermophilic spores entering the blancher or washer where the temperature is favorable will be liable to cause much heavier spoilage than any spores introduced into the brine which is subsequently sterilized before use. In the first instance the spores meet favorable growth conditions, in the second decidedly unfavorable conditions.

I cite from the "Annual Report of the Research Laboratories," National Canners' Association, 1929:

> During the pea pack, tests were made on the products of 65 canneries, representing 41 canning organizations. In 48 canneries spoilage was classed as low, in 13 canneries as moderate, and in 4 canneries as high. The high contamination was due in one case to blancher infection, supplemented by infection from *wooden* [italics are mine] brine tanks, and in the three remaining cases to blancher infection alone. In all four instances the wash which the peas received after blanching was inadequate. Forty-eight (74 per cent of all factories) had one or more blanchers infected by flat sour bacteria. The degree of infection varied considerably. This incidence of blancher infection confirms observations made in 1928, when blancher infection was found in 65 per cent of the factories in which tests were made.

I understand from Dr. Cameron's work that sugar may introduce thermophilic contamination into the canned product, through the medium of the brine, *if the brine is not sterilized.* I wish to confirm such a possibility, and refer particularly to the second paragraph of my letter on the subject, which appeared in your July issue.

On the other hand, no one who understands sugar, its characteristics and properties, and its delicate chemical nature, would criticise too severely a product with a purity of 99.90-99.96 per cent sold to the consumer at a price of 4.5-5.5c. per pound. A very casual inquiry into the matter would quickly bring to light the fact that, on economic grounds alone, it is highly improbable if sterile sugar can be industrially prepared, handled in bulk, shipped by common carrier, and set down at the canner's plant with the refiner's guarantee of sterility. I admit the theoretical value of such an ideal, but do not like to see bulk sugar at 4-5c. a pound impugned for those innate chemical characteristics which place such an ideal beyond reasonable expectation.

As Dr. Cameron has so ably pointed out, the brine should be sterilized, and he has given the canning industry very definite instructions how to accomplish this. It is well known that sugar solutions can be sterilized very readily by heat, whereas dry sugar cannot. This places the logical point for sterilization in the brine, just before the brine is used.

It is further quite apparent that sugar can take no part in process contamination occurring previous to the introduction of brine into the process. I have in mind particularly such outstanding points of infection as the blanchers and washers in pea canneries.

The question resolves itself into prevention of thermophilic spoilage in canned vegetables. As far as sugar is concerned, adequate sterilization of the brine will eliminate any contamination from this source. Thorough cleanliness, the steaming and flushing out of washers, blanchers, tanks, and the like, will to a great extent reduce contamination arising from the raw material, such as peas and corn. By the modern practice of promptly and efficiently cooling the cans at the end of the process, the temperature is brought below the point of thermophilic activity and even though there be an occasional thermophilic organism in the finished product, *from whatever source,* no spoilage will result as long as the cans are kept below this "safety" temperature, which in practice is usually considered 100 deg. F.

In reference to the exception taken to my use of the word "sanitation," I would point out that as there employed it broadly refers to the control of harmful bacterial activity deleterious to the product in question. It comes from the Latin *"sanitas,"* meaning health. Sanitation has become particularly applied to the protection of health by the control of conditions governing infection by and growth of micro-organisms (pathogens). As here used it applies to the protection and preservation of food products by the control of conditions governing infection by and growth of micro-organisms (thermophiles). I call attention to my *complete* sentence on this point: "I think you will agree that the probable answer to the problem will be one of reasonable care and sanitation in the processing of canned goods *coupled with an intelligent understanding of what constitutes the relative importance of the various sources of contamination.*

Referring to Mr. Cameron's statement, "His [meaning myself] remark that thermophiles may be found almost universally in every food product indicates he attaches the same significance to the aerobic thermophilic spore formers as he does to these with which we are now concerned." I made no attempt to distinguish between thermophilic spore-forming groups. We are here principally concerned with "flat sours," which are facultative anaerobes, and less important groups of obligate anaerobes, the "hard swells" and "sulphides." It was taken for granted that aerobes do not enter into the pres-

ent discussion. We are concerned only with those anaerobes, facultative or obligate, which cause spoilage in canned goods. CHANDLER D. INGERSOLL.
New York City.

* * *

To the Editor of FOOD INDUSTRIES:

In the July issue of FOOD INDUSTRIES there was published a communication from C. D. Ingersoll on the subject of thermophiles in sugar, in which was expressed the opinion that thermophilic contamination is a matter of plant cleanliness and sanitation. I do not agree with this opinion. I have observed thermophilic contamination of the flat sour type in canning plants where the sanitary conditions were above reproach and where any criticism with regard to plant cleanliness would be absurd. Any attempt to correlate contamination by thermophilic spoilage bacteria with the sanitary conditions of the plant will meet with failure.

The statement that "thermophilic organisms come under the classification of the soil bacteria" is open to considerable doubt so far as the spoilage bacteria are concerned. During the past summer, in an attempt to obtain some information on the distribution of the spoilage thermophiles in nature, I tested samples of soil, water, salt, and as a part of my routine duties tested also a large number of sugar samples and a number of splinters from brine tanks for flat sour bacteria, thermophilic anaerobes and sulphide spoilage bacteria. The soils were from fields cropped to grains, corn, peas, beans, asparagus and beets, as well as from virgin soils and meadows.

None of these groups was found to be widely distributed in soil. It is particularly significant and pertinent to the present discussion that the flat sour bacteria, which are most frequently involved in spoilage, were least abundant. These forms were encountered in only two of 55 samples of soil and were in quite low numbers (one per gram). Salt and water samples were negative but a considerable number of the sugar samples tested were positive, some being very heavily infected with highly resistant spores of flat sour bacteria. Similar results were obtained from brine tanks.

It appears that Mr. Ingersoll has failed to recognize the significance of the various groups of thermophiles. Bacteria which will grow at thermophilic temperatures are relatively abundant in soil. The spores of these common forms are not, however, very resistant to heat and are of little or no importance to the canning industry. Thermophilic spoilage bacteria, on the other hand, are rarely found in soils.

O. B. WILLIAMS,
Department of Bacteriology,
University of Texas.
Austin, Texas.

Book Review

MANUFACTURING COSTS AND ACCOUNTS. By A. Hamilton Church. Second Edition, Revised and Enlarged. Published by McGraw-Hill Book Company, New York, N. Y., 1929. 516 pp. Price, $10.

THE author describes three common methods of costing which he terms Methods A, B, and C.

Briefly, the A Method is one by which labor is merged with expense, and is recommended in cases where the product factors and the labor rate ranges are very similar, where labor can be justly charged to expense and where labor bears a somewhat generalized relation to the product. In general practice, the reviewer questions the practicability of Method A.

Costing on Method B, Chapter IV, treats with the more general and accepted practice of charging expense in proportion to direct labor. This chapter introduces the job order system of cost finding. The production order and operator's time sheets are recommended. A question may be injected at this point as to why the author throughout the entire book does not deal with and describe more in detail the use of standard costs in connection with cost finding and labor and expense distribution. This method is now accepted practice and is used by many modern and progressive firms. As regards standard costs the author states that "these have little or no relation to methods of distributing burden and are, in fact, rather a device for production control than for accounting in the strict sense." This statement is not in agreement with the resolution of the National Association of Cost Accountants, which has accepted the standard cost method of accounting.

Method C, which is described in the chapter headed "Expense Charged as When and Where Incurred," deals with the machine rate system of burden distribution. It is the reviewer's opinion that although this method is correct in theory, because of its complex nature it is generally impractical and seldom necessary. By this method the true cost is made known as compared to the apparent cost as determined by Method B. If more manufacturing concerns had only correct "apparent" costs, better management would be made possible and fatal business errors would be less frequent.

The remaining chapters in Section 1, "General Outline of Manufacturing Accounts," deals with assembly of the cost elements, the accounting of waste and spoilage, scrap, byproducts and kindred subjects, and the summarizing of the results of a business period.

Part 2, of the book deals with the subject of "Cost Accounting." In the opening paragraph the author states that "the object of this book is to provide the reader with an insight into the principles underlying manufacturing accounting." This he has done remarkably well and thoroughly; no criticism can be offered in that regard, as the book is admirably suited for instruction purposes.

Part 3, "Factory Reports and Returns," deals with the more interesting phase of cost accounting. "Reports and Returns to the Foreman, for the Superintendent, for the Executive," and the "Use of Diagrams and Charts" comprise the chapters in this last section. The reporting idle machine time and the unabsorbed burden are discussed considerably in this section. The reports illustrated indicate the use of budgets in connection with the control of manufacturing expense. To indicate the neglect of budget practice the author's limited discussion of this important subject follows:

"Budgets—In a business of an established character we can, by using alternate columns on the blank provided for that purpose forecast the expected value of each item; or in other words we can budget all the information thus setting a standard, variations from which may be cause for inquiry."

The foregoing brief discussion of a most important phase of modern cost accounting is the reason for my chief criticism of the book. Briefly, the book although complete as regards treatment of accounting fundamentals, lacks what modern management finds so very necessary today; namely, "more foresight and less hindsight."

WALTER C. HASSELHORN.

Government Publications

Stored-Grain Pests, by E. A. Back and R. T. Cotton. U. S. Department of Agriculture Farmers' Bulletin 1260; revised June, 1930; 15 cents. An elementary classification, description, and discussion of damage done by various types of insects and parasites.

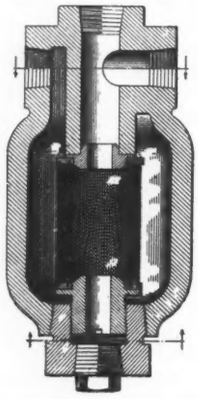
Animal and Vegetable Fats and Oils. Census Bureau pamphlet; 5 cents. Gives production, consumption, imports, exports, and stocks by quarters, for calendar years 1927 to 1929.

Improved Sanitation in Milk Production, by R. J. Posson, revised by C. S. Leete. U. S. Department of Agriculture, Leaflet No. 3; 5 cents. A leaflet suitable for distribution to farmers by dairy companies.

Court Decisions Relating to Public Health, 1926-1929. Prepared by William Fowler. Public Health Service Supplement 84 to Public Health Reports; 20 cents. Digest of decisions abstracted and published currently in Public Health Reports during period 1926-1929.

Selected Patents

Filtering Corrosion Products From Refrigerant—Ward S. Ireland to National Refrigeration Corporation, Beloit, Wis. No. 1,771,042. July 22, 1930—Refrigerant enters device at side through narrow passage into enlarged compartment surrounding a double-screened zone with outlets to flow line. Plug in bottom of device permits removal of scale; also of screens for cleaning purposes.



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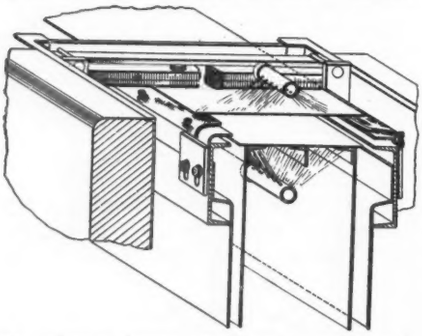
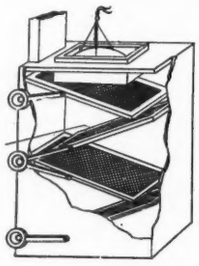
Quick Freezing Meat in Package Form—Clarence Birdseye, Gloucester, Mass., to Frosted Foods Company, Inc., Dover, Del. Nos. 1,773,079, 1,773,080, and 1,773,081. Aug. 12, 1930.—Meat products, especially cutlets and fillets, are closely packed and layered in cartons that are lined with moisture-proof material and have a maximum depth of 2 in. These packages are sealed in waxed or paraffined paper and fed into a refrigerating machine designed specially for this purpose. The illustration shows a cross-section of the machine, which is constructed essentially of two metal belts, relatively parallel to each other, 2 in. apart, and cooled in such a manner that the packages of meat are uniformly frozen from above and below. They keep the packages uniform in thickness until fully frozen, are driven so that the adjoining surfaces move in the same direction and at the same rate, and are independently cooled. Overlapping edges and compartment construction permit brine with a temperature of —20 to —50 deg. F. to be sprayed upon the belts to freeze the meat without brine coming in contact with the packages. Contents are completely frozen in 75 min. and ready for marketing without damage to flavor or texture.



Cereals Sterilized With Ultra-Violet Rays—Rome A. Schaffner, St. Paul, Minn. No. 1,768,635. July 1, 1930—Cereal to be treated is passed back and forth through apparatus and continuously exposed to influence of ultra-violet rays to destroy larvas and weevils commonly found in cereals. Mercury vapor lamps are the source of the ultra-violet rays. Illustration represents one form apparatus may take.



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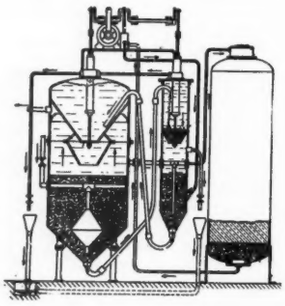
Continuous Zeolite Treatment of Water Under Pressure—Werner Neumann, Reppen, Germany. No. 1,770,580. July 15, 1930—In this apparatus the softening tank and a regenerating tank are so connected with each other that the exhausted filtering material is transferred to the regenerating unit. At the same time regenerated material moves from the regenerator to the softener. This is accomplished by means of valves connected in parallel by a common control. This common control mechanism at the same time releases a measured charge of salt solution into the regenerating container. Artificial or natural zeolites, especially the glauconites, may be used as chemically active filtering materials.



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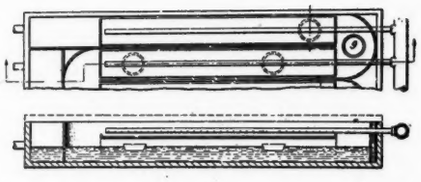
Synthesizing Vitamins A and D—August J. Pacini to Charles M. Richter, Chicago, Ill. No. 1,762,105. June 3, 1930—Cholesterol is irradiated with ultra-violet rays under a non-oxidizing condition for a given length of time. The treated product gives characteristic chemical color test and the xerophthalmia biological test for vitamin A. If irradiation be continued, tests are said to indicate presence of vitamin D.

* * *

Foodstuffs Frozen From Top and Bottom—Michel P. Vucassovich, Gloucester, Mass. No. 1,769,087 and 1,769,088, July 1, 1930—Apparatus consists of a partitioned vat by means of which containers charged with fish or the like are made to float on the surface of brine and under an overhanging surface continuously chilled by brine sprayed from superimposed outlets. Current set up by the continuous inflow of brine at the loading end of the runway and outflow at the other end of course causes the charged containers to proceed in a systematic and regulated manner. Illustrations show plan and longitudinal section views.



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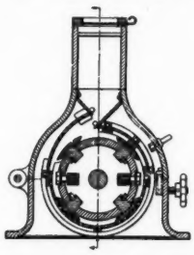
A Rugged Cutting Machine—Charles M. Stoner to the Wolf Company, Chambersburg, Pa. No. 1,769,888. July 1, 1930—A machine in which rotating grinding surfaces with cutting edges force material against rigid cutting or grinding units until fine enough to pass through screens. Machine is designed to cut or grind such food materials as grain, dried milk, roots, herbs, spices, and the like.



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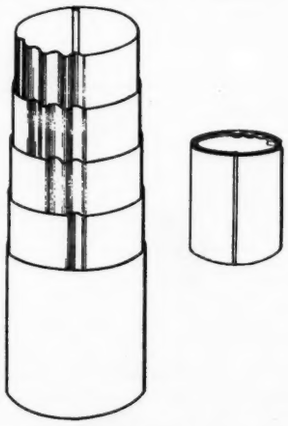
Can Bodies Fluted for Nesting Purposes—Walter M. Tomkins, San Francisco, Calif., to Continental Can Company, New York, N. Y. No. 1,765,182. June 17, 1930—Can bodies of same size and shape are progressively reduced in diameter by being fluted longitudinally. The body having the greatest number of flutes has smallest diameter. This progressive fluting permits a number of cans to be stored or shipped as a nest in the same space normally occupied by a single can body. The longitudinal seam is made permanent when can body is originally formed. This permits the body to be returned to normal shape ready for completion at destination with least number of operations.

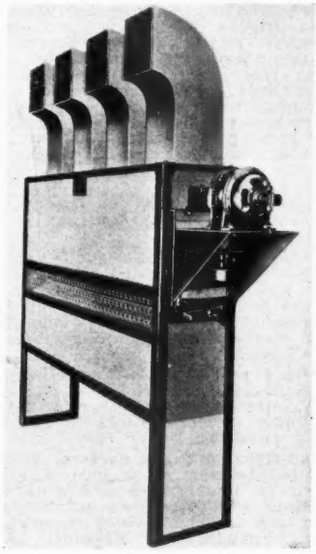


Manufacturers' News And Equipment

Heating by Diffusion

THE unit heater recently developed by the York Heating & Ventilating Corporation, Philadelphia, Pa., is a blender as well as a heater of air. Air of room temperature is blended with heated air inside the unit to give a final temperature consistent with the required room temperature.

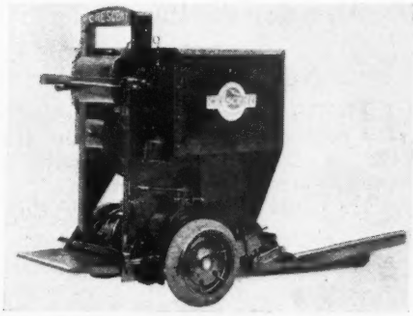
As the blended air leaves the unit it moves horizontally or diffuses into the room instead of flowing in a vertical manner common to heated air. Since the unit is constructed to hold the blended air at the lowest possible temperature to give the desired room temperature and since the air movements are horizontal in nature instead of entirely vertical, the unit operates with full steam pressure of the coils at all times without the room becoming overheated. The control on these units may be manual or automatic in operation.



Medium Duty Electric Lift Truck

A NEW type of electric power lift truck has been developed by the Crescent Truck Company, Lebanon, Pa., for use with hand truck platform skids 7 in. high or over.

This truck was designed to fit into a field between the larger, heavier industrial power truck and the ordinary hand-lift truck. It has a capacity of 3,500 lb., a cantilever spring suspension on the driving unit, rubber tires on all four wheels, a 3-in. underneath clearance, and a 3¼-in. lift.



Exclusive of operator's wages, total operating costs are said to be less than 18c. per hour, including depreciation, interest on investment, and all other such overhead charges.

Electric Truck With Movable Platform

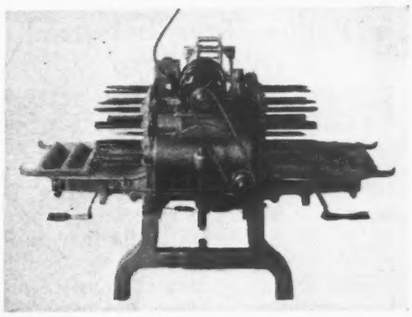
GREATER utilization of storage space has been made possible recently by the development of a telescopic tier-lift truck. This truck is capable of operating throughout the plant, running through doorways, and lifting a load as high as 15 ft.

The accompanying illustration shows one of the trucks operating in connection with the unloading of a car remote from the receiving platform. According to the Wright-Hibbard Industrial Electric Truck Company, Phelps, N. Y., it is designed for piling in warehouses, loading to and unloading from mezzanine floors, icing refrigerator cars, making overhead installation or repair, and other similar work.

Remote control arranged on the side of the channels permits the operator of the truck to ride on the platform and load or unload material and to stop the platform at any desired height. The truck is equipped with a ladder to give easy access to platform in raised position and can be supplied with platforms of various sizes and runner height. Due to its compactness of design and short turning radius, it can operate under congested condition.

New Two-Way Boxing Machine

CASING production is said to be increased 35 per cent by the duplex boxing machine developed by the New Way Canning Machines Company, Hanover, Pa. Operation of a single lever and foot pedal secures alternate right-hand and left-hand discharge. Two cases are attached to the machine at the same time. When the one case is filled the lever is drawn and the cans are turned into the other case.

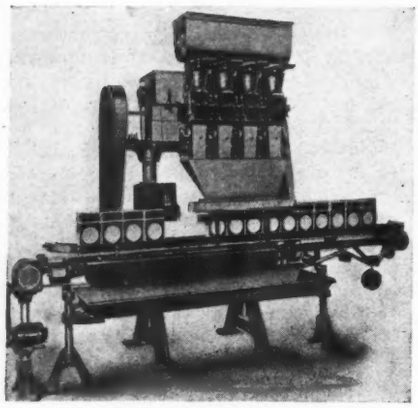


While the second case is filling, the operator replaces the full case with an empty one, and so on, to keep the boxing machine in continuous operation to give a production of as much as 700 cases of 2-lb. cans per hour. By making use of special feeding devices the production is said to be increased.

Multiple Unit Weighing

THE Hi-Speed Net Weight packaging machine developed by the Pneumatic Scale Corporation, Ltd., Norfolk Downs, Mass., is said to give high production without sacrifice of accuracy in weight. The machine as illustrated delivers 60 packages per minute. The hoppers are designed to deliver about nine-tenths of the required weight to the container as a bulk load. The remaining one-tenth dribbles in slowly to give the desired weight, which causes the scale beam to trip and shut off the flow of material.

Each filling mechanism operates as a separate unit at the rate of fifteen packages per minute, thus giving a high production for a machine of four units



without causing undue vibration and other disturbances that would interfere with accurate weighing.

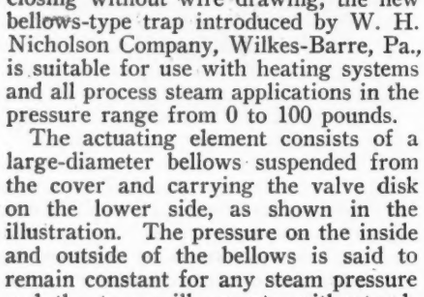
Free-flowing materials, such as rice, tea, coffee, sugar, and the like, are reported to be handled satisfactorily. The flow of packages in and out of the machine and the dumping of the material into the container are automatically controlled by the weighing mechanism. Various safety and timing devices prevent empty or partly filled packages from leaving the machine.

Bellows-Type Industrial Steam Trap

EMBODYING a balanced-pressure principle with quick opening and closing without wire drawing, the new bellows-type trap introduced by W. H. Nicholson Company, Wilkes-Barre, Pa., is suitable for use with heating systems and all process steam applications in the pressure range from 0 to 100 pounds.

The actuating element consists of a large-diameter bellows suspended from the cover and carrying the valve disk on the lower side, as shown in the illustration. The pressure on the inside and outside of the bellows is said to remain constant for any steam pressure and the trap will operate without adjustment on any pressure from 0 to 100 pounds.

As long as steam is present in the trap the valve remains closed, owing to the internal and external pressure on the bellows being in a balanced condition. The presence of water in the trap dissipates the internal pressure and the valve opens, because of the pressure difference established. As the valve is wide open when cold, any air that collects in the trap and piping is automatically discharged when the steam is turned on.

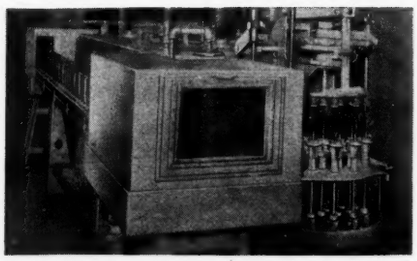


Capacities in pounds per hour range from 545 lb. at 0 lb. pressure to 7,720 lb. at 100 lb. pressure for the ½-in. trap and from 4,970 to 70,500 lb. at corresponding pressures for the 2-in. size.

New Bottle Washer

HIGHER degree of sterilization for bottles is said to result from the use of brush washing of bottles between water-soaking operations.

The bottle washing machine developed



by the Miller Manufacturing Company, Bainbridge, Ga., operates in a horizontal plane approximately waist-high and provides for inside brushing of the bottles after they have been soaked to loosen the dirt. After the brushes have removed this dirt and the occasional paper cap, the bottles pass to the second soaking compartment to be sterilized.

Bottles of all sizes, including the crown seal type, are said to be handled in a satisfactory manner. They are soaked, rinsed, brushed, and rerinsed.

Manufacturers' Publications

Connecticut Market Data—Market Data Bureau, 55 West 42d St., New York City, has prepared a 56-page booklet containing a field study of retail trading areas and a comprehensive and convenient compilation of market data as characteristic of the state of Connecticut.

Electrical Water Meters for Bakers—The J. H. Day Company, Cincinnati, Ohio, illustrates and describes its thermostatic water blenders and electrical water meters in an attractively illustrated folder.

Using the Microscope to Increase Profits—A bound 20-page booklet, published by Owens-Illinois Glass Company, Toledo, Ohio, illustrates and describes the facilities and work of the research division laboratory of this company.

Food Rules and Regulations—In a 12-page bound booklet, published by the American Medical Association, 535 North Dearborn St., Chicago, Ill., the committee on foods of the council of pharmacy and chemistry of this association gives information on the "Seal of Acceptance" in connection with foods accepted by the *Journal of the American Medical Association, Hygeia,* and listed in a book entitled "Accepted Foods."

Bakery Refrigeration and Air Conditions—By photographic illustrations and diagrammatic drawings, the York Ice Machinery Corporation, of York, Pa., describes in an attractive leaflet equipment developed by it for the baking industry; known as Bulletin No. 30112.

Doughnut Machinery—A bound 32-page booklet has been prepared by the Doughnut Machine Corporation, 1170 Broadway, New York City, to illustrate, describe, and show practical application of its machinery for economical production of doughnuts.

Cellophane Wrapped Pies—In an illustrated folder the American Bakery Equipment Company, 1049-1051 Howard St., San Francisco, Calif., calls attention to its machine designed to successfully wrap pies in cellophane. Attention is called also to the display rack for the wrapped pies.

Electric Automatic and Remote Control—A 12-page illustrated booklet, prepared by the Reeves Pulley Company of New York, Inc., 76 Dey St., New York City, to show application of the Reeves variable-speed transmission machinery.

Glass-Lined Equipment—Various types of glass-lined equipment are illustrated and described in the 20-page booklet by the Pfaudler Company, Elyria, Ohio, known as catalog No. 714.

Diesel Engines—Vertical, four-cycle, air-injection Diesel engines manufactured by the Worthington Pump & Machinery Corporation, executive offices, 2 Park Ave., New York City, are illustrated by diagrammatic drawings and photographs in a 44-page booklet known as bulletin S-500-B_2A. A lubricating oil system for all working parts is illustrated in detail by diagrammatic drawing.

Rotor Induction Motors—In illustrated leaflets and other illustrated releases, the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., announces and describes its CW. wound rotor induction motors for general industrial application, its manual type starters, and its speed regulators for wound rotor motors. Sealed sleeve bearings for industrial motors and a new brush-holder which prevents sparking are also announced and described.

Heat Transfer Unit—Catalog EC-1, prepared by the Construction Engineering Corporation, 200 Madison Ave., New York City, is devoted to the C-E economizer, fin-tube type.

Canning Supplies and Equipment—Catalog No. F-102, consisting of 96 pages, contains illustrations, specifications, and prices on the full line of canning supplies and equipment manufactured by the Sprague-Sells Corporation, 308 West Washington St., Chicago, Ill.

Drop Center Trucks—Step N-Drive Truck Corporation, 1255 Niagara St., Buffalo, N. Y., illustrates and describes its 4- and 6-cylinder delivery trucks in a folder recently published.

Anti-Friction Truck Casters—Bond roller and ball-bearing truck casters are illustrated by photographs and diagrammatic drawings and fully described by specifications in a 52-page booklet prepared by the Bond Foundry & Machine Company, Manheim, Lancaster County, Pa.

Bakery Equipment—A full line of bakery machinery manufactured by the J. H. Day Company, Harrison Ave. and Bogen St., Cincinnati, Ohio, is described in a 72-page catalog—No. 205.

Electric Control Apparatus—In a series of releases illustrated by photographs, Cutler-Hammer, 12th & St. Paul Ave., Milwaukee, Wis., announces its resistor starter for fractional horsepower motors, a.c. motor starter with fusible disconnector switch, automatic starters for a.c. multi-speed motors, and its three-position pilot switch.

Soy Bean Products—An illustrated 20-page booklet, attractively bound, devoted largely to soy beans and soy bean products, has been prepared by the Allis-Chalmers Manufacturing Company, Milwaukee, Wis. This booklet, which is known as Bulletin No. 1246, also contains a list of the products and apparatus manufactured and merchandised by the Allis-Chalmers company.

Mechanical Agitators—Catalog 106 of the Paterson Foundry & Machine Company, East Liverpool, Ohio, is a 12-page booklet describing and illustrating types of industrial mechanical agitators.

Box Car Loaders—The mechanism employing centrifugal force to load box cars or ship holds is illustrated and described in leaflets prepared by the Stephens-Adamson Manufacturing Company, Aurora, Ill. It is manufactured in light-duty and heavy-duty sizes.

News of the Month

Conclude Testimony on Packers' Decree; Argument Begins Dec. 1

TAKING of testimony in the packers' decree modification action before the Supreme Court of the District of Columbia was concluded on Nov. 14. Voluminous evidence both for and against modification was placed in the record by several hundred witnesses in the sessions, which extended over more than a month. Oral argument on the significance of the evidence and the law will be heard by Justice Jennings Bailey beginning Dec. 1, and counsel for the packers and those opposing modification were allowed to file briefs in the meantime.

Following a stipulation of counsel signed by numerous meat packers and livestock dealers to the effect that there is active competition in the meat-packing industry, attention was turned to the future plans of the packers now bound by the decree. President F. Edson White of Armour & Company; Vice-President G. F. Swift of Swift & Company; R. F. Engle, assistant to the president of Wilson & Company; and Edward A. Cudahy, Jr., all testified that they had made no plans for retailing of meats. In fact, according to Mr. White, removal of the restrictions might remove the necessity to retail. "The very fact that we are restricted gives an advantage to our competitors," he said. The restrictions have prevented them from making necessary reductions in distributive costs to meet the situation as it has been met by competitors outside the decree, he pointed out.

In addition to testimony on meat products, representatives of grape growers' associations told of hardships they would face should the packers' grape-product plants be forced to shut down. The California Co-operative Canneries was organized previous to the consent decree, because fruit growers thought that Armour & Company, with whom they had contracted, offered a satisfactory outlet for canned fruits, according to George N. Pfarr, president. Unless the present wholesale brokerage system of selling under hundreds of brands is changed so that sales are concentrated under a few well-known brands, he said, the small fruit canner will have to go out of business.

Counsel for the packers rested their case on Nov. 4, and introduction of testimony to support the contention of the Department of Justice that the decree should not be modified was begun by Harold B. Teegarden, assistant to the Attorney General. A stipulation signed by a number of food manufacturers and wholesalers to the effect that modification of the decree would be injurious to their industry and their customers was presented. Charges of improper business practices in purchasing fat and offal were made by witnesses against modification, and attempts to fix prices in several instances also were mentioned.

John A. Hartford, president of the Great Atlantic & Pacific Tea Company, testified that 90 per cent of the meats sold in its chain stores came from the "Big Four," and that prices would be increased if this source were cut off. Several independent retailers said that entry of the big packers in the retail field would be the final blow to the independent store.

Shipment in less than carload lots, which would be possible for the packers if restrictions were removed, would be "very disastrous," according to Jay D. Miller, vice-president and general counsel of Sprague-Warner Company, Chicago manufacturers and wholesalers.

When the quick-freezing process is fully developed, according to J. Frank Grimes, president of the Independent Grocers' Alliance Distributing Company, Evanston, Ill., owners of the patents would be able to "completely control the meat business."

After Roy F. Clarke, president of the Central Wisconsin Canneries, Beaver Dam, Wis., had testified that distribution of canned goods by the packers would greatly injure canners, the government and the wholesaling organizations supporting the decree rested their case.

Rebuttal testimony brought denials from Swift & Company representatives that the "service-at-cost" method of buying cream had caused injury to competitors. It was later abandoned as unsatisfactory, they pointed out. It was also brought out that, while salesmen were given permission to cut prices on occasion, this was never carried beyond the bounds of legitimate business enterprise.

Whatever Justice Jennings Bailey's decision may be, an appeal will be taken direct to the U. S. Supreme Court, thus hastening a final decision on the packers' plea to enter the race to the public's dining-room table without a handicap. Announcement by the packers that they have not formed any plans anticipating victory in the courts has not prevented speculation on what they would do if the handicap is removed. It is assumed that the first possibility would be the distribution of grocery products through the channels now confined to meats.

Interest centers principally on the question whether the packers actually would go into retailing. It is surmised in official and other quarters that instead of opening their own stores they will seek to tie into the ownership and management of the chains already doing business on every corner, thus creating a great vertical organization from processor to consumer not immune, perhaps, but resistant to attack under the anti-trust laws.

There is no attempt to predict whether any of the big chain-store systems would welcome a merger with either Swift or Armour. The chains have been reluctant to date in stepping backward into processing while driving forward into distribution. But if the consent decree is swept aside there is no telling what turn the evolution in the distribution of food products will take.

COMING EVENTS

DECEMBER

2—American Association of Creamery Butter Manufacturers, Palmer House, Chicago, Ill.
2-4—Southern Association of Ice Cream Manufacturers, Tutwiler Hotel, Birmingham, Ala.
2-6—American Society of Refrigerating Engineers, New Yorker Hotel, New York City.
8-10—American Institute of Chemical Engineers, New Orleans, La.
9—Milk Sugar Institute, Inc., New York City.
26—Associated Bakers of America, Sherman Hotel, Chicago, Ill.
29-31—Society of American Bacteriologists, Hotel Kenmore, Boston, Mass.

JANUARY

5-7—Northwest Canners' Association, Multnomah Hotel, Portland, Ore.
13—Southeastern Millers' Association, Nashville, Tenn.
19-23—National Canners' Association, National Preservers' Association, National Pickle Packers' Association; National Food Brokers' Association; Canning Machinery and Supplies Association, Chicago, Ill.
23—Evaporated Milk Association, Chicago, Ill.
27-29—Western Confectioners' Association, Olympic Hotel, Seattle, Wash.
31—American Cranberry Growers' Association, Walt Whitman Hotel, Camden, N. J.

Canners Must Get Produce Licenses; Other Government News

By Paul Wooton
Washington Correspondent

PRACTICALLY all canners will be required to obtain federal licenses under the new Perishable Agricultural Commodities Act, effective Dec. 10, states a last-minute ruling by the Department of Agriculture. All canners who ship their finished products in interstate commerce come under its provision, according to the latest view. Previously it had been understood that the law, which is intended to stamp out unfair and fraudulent practices in the produce trade, would apply only to canners buying fresh stuff outside the state in which they are located and to those selling surplus produce in interstate commerce.

C. W. Kitchen, assistant chief of the Bureau of Agricultural Economics, states that under the interpretation placed on the act by the department's sclicitor, the statute applies not only to canners who buy fresh fruits and vegetables in carload lots in interstate commerce but also to canners who buy their fruits and vegetables in the same state where the cannery is located and who thereafter ship their products in interstate commerce. If a canner contracts to purchase an entire crop it is considered a purchase in carload lots whether it is actually delivered to him in carload lots or in smaller units.

Preserve manufacturers, too, have been brought under the new law both by this ruling and another which holds that the term "perishable agricultural commodity" as used in the act includes cold-pack fruit. As defined in the law, this term means "fresh fruits and fresh vegetables of every kind and character, whether or not frozen and packed in ice."

The National Canners' Association issued a bulletin to its members immediately upon learning of the department's ruling. The department has issued a warning that no period of grace beyond Dec. 10 will be allowed in which to obtain license. It is doubtful, however, whether those commission merchants, dealers, brokers, and canners who fail to file application by that date, although liable, will be subjected to the penalty of not to exceed $500 plus $25 per day recoverable by the government in civil court procedure. Rather than prosecute for failure to obtain licenses, the department will wait until complaints of unfair practice against those operating without licenses are received and then add this charge to those alleged in the complaints.

In practical effect, the department's ruling bringing canners within the scope of the act is regarded as accomplishing nothing more than imposing upon them a nuisance tax of $10 a year, the fee required for obtaining a license. Cases probably will arise from complaints filed by growers against canners alleging unwarranted rejection of shipments or something of the sort, but this possibility is not now regarded seriously.

Preserve Bill May Be Scrapped

Preserve manufacturers may decide not to press to enactment the Haugen bill to establish statutory standards for preserve, jam, jelly, and apple butter, but depend upon the new Mapes Act for protection against the competition of so-called imitation products deficient in fruit content. Intended to apply primarily to canned fruits and vegetables, the Mapes, or "canners," law requires that all food products except meat and meat food products and canned milk, sterilized by heat and put up in hermetically sealed containers, must be labeled substandard if they do not meet minimum standards which the Food and Drug Administration is authorized to establish. The preservers are inclined to believe that the standards which the administration would promulgate for their products would be sufficient to distinguish between high and low grades.

The proposal of the preservers has not met with much favor among officials in the Food and Drug Administration, and it is practically certain that the Secretary of Agriculture would not consider setting up standards for preserves under the Mapes Act unless there is an intimation that Congress would not object. Explaining that Congress unquestionably had the staple articles of canned food in mind in enacting the law, food officials believe that their first duty is to establish standards for such articles. It is pointed out that establishment of standards is not mandatory.

Government officials are prone to regard the proposal of the preservers as a "back-door" method of accomplishing their purpose as Congress has refused to consider favorably the bill put forward by the preservers. True, they say, the bill has passed the Senate and is pending under an expediting rule on the House calendar, but in a mutilated form which they regard as evidence that the original bill was not acceptable.

Tariff Revision Under Way

Revision of tariff rates on food products under the flexible provisions of the new law began on Nov. 12 with a hearing before the Tariff Commission on maple sugar and syrup. Other items scheduled for action include edible gelatin on Dec. 12; canned tomatoes and tomato paste on Dec. 17; and cherries, sulphured or in brine, on Dec. 18. Reductions in the rates of duty on these foodstuffs, canned tomatoes excepted, are sought in applications filed by private business. With the exception of gelatin, investigation was directed by Senate resolutions. Other investigations now under way, ordered in response to Senate resolutions, include refined sugar, olive oil, cheese, confectionery, and chocolates.

No action has been taken to date on private applications for a reduction in duties on green peppers and fresh tomatoes sought by produce growers and dealers in Texas, New Mexico, Arizona, and southern California; on fresh eggplant, cucumbers, lima beans, okra, and grapefruit sought by Hutcheson & Company, Inc., New York City; on fresh pineapples by Hutcheson & Company and Arthur Serra & Company, Chicago; nor on applications for an increase in duties on dried eggs filed by the National Poultry Council, Sebastopol, Calif.; and on barley malt, filed by the Cereal Products Company, Manitowoc, Wis., and fourteen other manufacturers of malt. Application for a reduction in the duty on edible gelatine has been submitted by the Netherlands Legation on behalf of the Delft Gelatine Works.

At the hearing on maple sugar and syrup, John Paton, secretary of the John C. Paton Company, New York City, argued in support of the company's application for a reduction in duties to 5.3 cents a pound on sugar and 3.5 cents a pound on syrup, the rates recommended in 1927 in a report of the Tariff Commission to President Coolidge. The American Farm Bureau Federation countered with a plea for an increase to 9 cents on sugar and 6 cents on syrup. The duty of 8 cents on sugar in the new tariff is double the old rate, and the duty on syrup was increased from 4 to 5.5 cents a pound.

The plea for an increase in duties was made by W. R. Ogg, representing the American Farm Bureau Federation, and spokesman for the Vermont Maple Products Co-Operative Exchange, the Vermont Farm Bureau Federation, the Vermont State Agricultural College, the Vermont State Bankers' Association, and the Maple Producers' Co-Operative Association of New York. George C. Cary, representing the Cary Maple Sugar Company, St. Johnsbury, Vt., stated that domestic costs are considerably higher than Canadian costs. Mr. Paton testified that in 1927 the Cary company, described as the largest factor in the domestic industry, had favored a low tariff on the ground that there is no difference between costs in the United States and Canada.

Campbell's Soup Company has withdrawn its application for a reduction in the duty of 35 per cent on soups. Prior to Sept. 17, when the new Canadian tariff went into effect, Canada levied a countervailing duty of 35 per cent on soups imported from the United States; in other words, a reduction in the United States duty at that time would have meant an equivalent reduction on soups shipped into the large Dominion market. In the new Dominion tariff, however, the countervailing provision was removed and the duty fixed at 35 per cent regardless of the duty levied by the United States.

Cleveland Dairy Show Bigger Than Ever

The Dairy Industries Exhibition continues to be the largest display of equipment in the entire food field. At the Cleveland exhibit, Oct. 20-25, 10 per cent more space was used than in 1929. A new record for visitors was also set, with a registration of 11,926. New equipment exhibited at the show will be described in the "Manufacturer's Equipment" section of FOOD INDUSTRIES *as rapidly as possible.*

Dairy Engineers Consider Plant Problems At Cleveland Meeting

VALUABLE information on the engineering aspects of the dairy industry was brought out at the second annual meeting of the dairy engineering committee of the American Society of Agricultural Chemists, held in connection with the Dairy Industries Exposition in Cleveland, Ohio, on Oct. 24.

In a paper entitled "Plant Equipment Supervision," H. F. Judkin, superintendent of production of General Ice Cream Corporation, showed the need for a systematic maintenance plan.

Ward E. Guest, of Kraft-Phenix Cheese Corporation, pointed out the need of data on cements and plasters for floors and walls of dairies. He stated that aluminum paint was not satisfactory for machines where it comes in contact with caustic, because the caustic may cause the paint to turn black. Roof guarantees, he said, should come in for more careful consideration.

H. A. Sieck, general sales manager of the Creamery Package Manufacturing Company, in discussing the field for dairy engineers, said he believed that the advertising value of show plants was greatly overestimated. The service of the dairy engineer, he stated, was an insurance against uneconomic and inefficient plants.

"Standardization of Dairy Machinery," a paper by M. Van Antwerpen, vice-president of Gridley Dairy Company, Milwaukee, treated standardization of sanitary pipe fittings, instruments, and thermometer spuds. In speaking of the defects of pasteurizing equipment, he showed that the apparent cream volume was reduced 13 per cent by pasteurization at 145 deg. F., compared with results at 142 degrees.

Lack of uniformity of dairy codes in different localities imposes a severe task upon the dairy equipment designer, Harvey Feldmier, chief engineer of Cherry-Burrell Corporation, brought out. Fortunately, this evil is slowly being corrected by the Association of Dairy Inspectors, he said. Mr. Feldmier believed that the proposed sanitary codes should be limited to the objective to be attained without dictating the manner of their attainment.

New methods and materials such as the new alloy steels and use of welding present an ever-recurring problem of design, Mr. Feldmier said. The modern trend toward simplicity of design, which makes for ease of cleaning, accessibility, visibility, round corners, and smooth joints, is a big advantage.

"Disposal of Creamery Waste," presented by Max Levine, of Iowa State College, showed that while 50 to 60 parts per million was the oxygen consumed by ordinary industrial waste, dairy waste showed an oxygen consumption of 400 to 600 parts per million. Lactose, or milk sugar, is at the bottom of all of the troubles involved in the disposal of creamery waste. He described a system of aerobic sewage treatment in which the flow of sewage through the filters represents 500,000 gal. per acre per day. With dosing in a 5-minute cycle, satisfactory results have been obtained in 6-ft. cinder filters. An important feature which is essential to successful operation is grit and fat removal, but it must be carried out so rapidly that it will not prolong the holding period to the extent of permitting acid to develop from the lactose in the dairy waste.

Ice Cream Manufacturers Confer on Technology

BECAUSE raw materials from other food industries are directly or indirectly affected by the technology of the ice cream manufacture, many papers presented at the Cleveland convention of the International Association of Ice Cream Manufacturers had an unusually wide significance.

Staleness of flavor in strawberry ice cream upon storage can be largely ascribed to the quality of the berries themselves, according to a paper by C. S. Mudge and L. O. Tucker, of the University of California, read by C. A. Phillips. In these "Studies on the Bacteriology of Cold-Packed Strawberries," it was found that aeration of berries was partially responsible for development of a flavor that may lead the ice cream to be scored as unclean. The desirability of smaller tins for cold storage of the berries to reduce air contact was suggested by this finding. Heating the berries in sugar in glass bottles before chilling was found to result in a better flavored ice cream, and preheating or pasteurizing the berries and sugar at 170 deg. F. appeared to offer possibilities for further investigation. As no particular correlation between berry spoilage, as measured by the number of organisms found, and flavor of berries or ice cream was discovered, it was suggested that factors other than bacteria or enzymes were involved.

In a symposium on improved methods of freezer operation, the proponent of the brine system was E. N. Hersey. Before installing a new brine cooler, he had difficulty maintaining a brine temperature of 0 deg. F., which in turn necessitated a 10-minute period per batch of ice cream frozen. A new brine cooler gave a temperature of —10 deg. F., and careful tests showed that the time required for transfer was ½ minute; for freezing 2 to 3 minutes; for whipping 1 to 1½ minutes; and for drawing, ½ minute. The total was 5 to 6 minutes per batch. Power cost with the brine cooler was 1.083 cents per gallon of ice cream.

N. E. Olsen then discussed the direct expansion of ice cream freezing, citing as its advantages the elimination of the expense of brine equipment and economy of operation, due to the use of higher suction pressures. Speed of freezing with brine freezers depends on the volume of the brine, a condition which is not a factor with flooded ammonia systems. Greater capacity per freezer unit and elimination of heat transfer losses, as well as rusty pipes and streaks, were also in its favor, he said.

From results of a co-operative project on the effect of mix aging on freezing properties, H. F. Judkins, of the General Ice Cream Corporation, held that in general the importance of aging the mix is much less than was previously supposed. B. E. Horrall showed that homogenization cannot entirely replace gelatin in securing the best body and textures for ice cream.

U. S. Dept. of Agriculture

Continue Work on Canned Food Standards

JUDGING canned peas at the Department of Agriculture laboratory in Washington has been one of the many steps taken in drawing up standards under the Mapes Law. From left to right are V. B. Bonney, chemist, Food and Drug Administration; Miss H. Jeffery, proprietor of a cafeteria; Dr. Paul B. Dunbar, assistant chief of the Food and Drug Administration; and Dr. G. Adams, nutrition specialist, Bureau of Home Economics.

Hearings on the standards, originally set for December, may be postponed until January to meet convenience of canners, especially those from the Pacific Coast, attending the National Canners' Association convention in Chicago, Jan. 19-23. Tentative definitions for distinguishing between standard and substandard canned peas, salmon, and several fruits will be submitted to the industry for criticism at the hearings.

Conditions Hold Promise For Food Field

IN SPITE of the continuation of a good volume of retail buying, general industrial production remains at a low rate. With the effect of Christmas buying yet to be registered, the prospect of depleted stocks is the most favorable factor in sight for a renewal of manufacturing activities.

Lacking pronounced stimulation from this or any other quarter, the general tone of conditions is somewhat lower than in October. The index of *The Business Week* for the last of that month, reported in FOOD INDUSTRIES for November, stood at 84.7 per cent of normal. At the end of November it had dropped to 81 per cent.

In the food field, in spite of a further drop in the food index number, as reported by Bradstreet, to a new low for the year of $2.61, business continues on the whole better than in most other lines. As far as can be seen from the available facts, the food business appears to have reached its lowest ebb about Nov. 1, and now appears to be on the upgrade. Sales by large units are good, as is indicated by the improvement of about 10 per cent over 1929 registered by General Foods Corporation and the increase in tonnage volume and net shown by Atlantic & Pacific and other concerns. Such increases are normal, in view of a yearly increase in population not far short of the two million mark.

With retail food consumption well maintained, it is largely due to the steady lowering of retail prices, losses in inventories, and the adjustment of expense ratios downward to the new price levels that food companies are not highly prosperous. Improved profits should follow close on the heels of any slight upturn in retail price levels.

Mayonnaise Association Holds Fifth Convention

A CHANGE of name from Mayonnaise Products Manufacturers' Association of America, Inc., to Mayonnaise Manufacturers' Association was one of the accomplishments in the interests of businesslike simplification at the fifth annual convention of the group held in Atlantic City, N. J., Oct. 28 and 29. Officers elected for the ensuing year are William R. McKeldin, of Atmore & Son, Inc., Philadelphia, Pa., president; Ellis R. Meaker, of Ivanhoe Foods, vice-president; L. Everet Landon, secretary; E. P. Kelly, Capitol City Products Company, treasurer; Frank Honicker, Philadelphia, Pa., executive manager.

"The Way Out of Our Business Depression" was discussed by James M. Matthews, of Babson's, Inc., who predicted that we have entered a period of declining commodity prices that will last for a considerable time.

Mayonnaise as a companion to butter on the dinner plate was suggested by H. Powell Warwick. He took meticulous care, however, to avoid advocating mayonnaise as a substitute for butter. The standard definition of mayonnaise, Dr. P. B. Dunbar, of the Food and Drugs Administration, pointed out, is a concept of what the consumer should expect of mayonnaise. As a definition it has not yet been adjudicated.

The marked increase in sales of salad dressing in 1929, amounting 52 per cent, as contrasted with the increase in sales of mayonnaise of 8 per cent, was ascribed by Clarence Birgfield, of the Department of Commerce, to the change in labeling brought about by the recent final definition of standard mayonnaise.

"Giving Away the Profits" was the topic of L. V. Burton, editor of FOOD INDUSTRIES, who stressed the fact that many of the devices of commerce, such as special discounts, allowances for advertising never done, free deals, prepaid freight, and the like, are substitutes for salesmanship that involve giving away the profits.

Financially irresponsible competition will always be present where it is possible to enter business without a large capital outlay, he said, but restriction of too liberal credit by supply houses can do much to prevent it.

The injurious action of air in mayonnaise was discussed in a paper by Albert K. Eckstein and Benjamin R. Harris. Dissolved air, emulsified air, occluded air, and voids at the top of the bottle are some of the forms in which it appears, but emulsified air is considered to be the most serious. The surface of mayonnaise exposed to air in the voids at the top of an 8-oz. jar usually is less than 5 sq.in. This is in marked contrast to the surface of mayonnaise exposed to the emulsified air in an 8-oz. jar, which is calculated to have an area of exposure amounting to 10,000 to 15,000 square feet.

EMULSIFIED AIR IN MAYONNAISE
(Exclusive of Air in Voids)

	Sp. Gr.	Lb. per Gallon	Air Volume cc. per 100 Gm.	Remarks
A	.....	.....	11	Emulsified
B	0.920	7.59	13	Emulsified
C	0.930	7.78	11	Emulsified
D	0.966	8.08	7.5	Homogenized
E	0.875	7.32	15.5	Emulsified

Note: Sample E was prepared to contain an unusually high amount of air.

A new piece of apparatus for measuring mayonnaise consistency, known as a plumit, was described by Dr. L. B. Kilgore.

Among the more important resolutions passed by the association were recommendations for an educational campaign on trade practices, and for standardization on ⅛-pint, ½-pint, 1-quart, and 1-gallon jar sizes.

Coffee Roasters Convene In New York

STIMULATION of consumer interest in good coffee was the theme of the twentieth annual convention of the National Coffee Roasters' Association, held at the Hotel Pennsylvania, New York City, Nov. 10-13.

Emphasizing the fact that coffee consumption in 1926-30 was only 0.5 lb. per capita greater than it was in 1901-05, J. W. Millard, formerly of the U. S. Department of Commerce, explained to the coffee roasters that they had made no gain on the existing market.

Carl Dipman, editor of *The Progressive Grocer,* indicated the importance of the various merchandising outlets. Such subjects as standardization of 1-lb. containers, scope of trade association activities, and relations with Latin America were dealt with by representatives of the United States, Colombia, and Brazilian governments in addresses before the convention.

Officers elected for the coming year are: Lot Beardman, Wm. S. Scull Company, Camden, N. J., president; B. C. Cazanas, of B. C. Cazanas & Company, first vice-president; E. M. Cofer, of Hills Bros., second vice-president; D. B. Foster, of Stanley W. Ferguson Company, treasurer.

Food Consumption Data Now Available

A FULL statistical résumé of data on consumption of foods was made available on Nov. 17 by the Department of Commerce in a publication entitled "Apparent Per Capita Consumption of Principal Foodstuffs in the United States." The publication is listed as Domestic Commerce Series No. 38.

E. G. Montgomery, the senior author of this document, has been presenting his own interpretations of some of the more outstanding conclusions in the columns of FOOD INDUSTRIES during the last few months. Copies of the booklet can be purchased for 10 cents from the Superintendent of Documents, Government Printing Office, Washington, D. C.

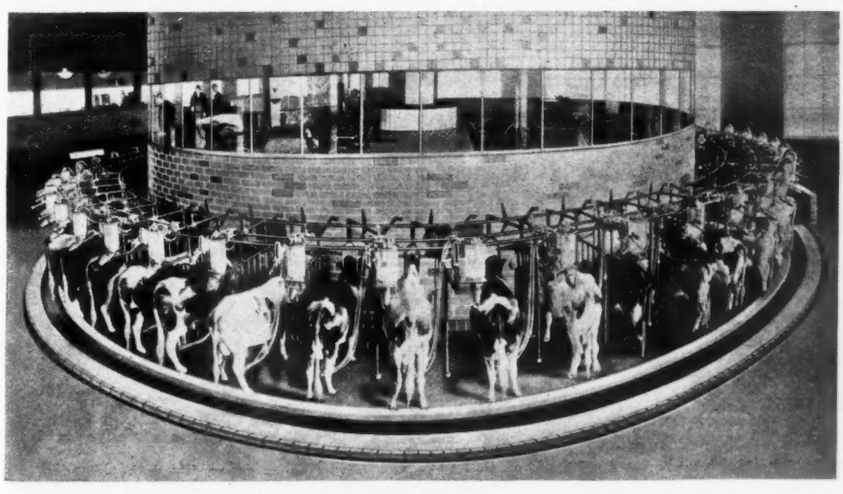
Factory Methods Applied to Milk Production

ANOTHER advance in the nearly 40-year old experiment to develop centralized control over the production and processing of milk was signalized on Nov. 13 by dedication of the "Rotolactor," a mechanical grooming and milking unit, in the Walker-Gordon Laboratories, at Plainfield, N. J.

Since 1898, Henry W. Jeffers, president of Walker-Gordon Laboratories of the Borden Research Foundation, New York City, has been correlating research in dairying, agriculture, nutrition, business administration, and industrial engineering to work out a plan by which milk of the highest possible quality can be economically produced.

The result is an industrialized plan including selection and care of the cows as well as processing and merchandising of the milk. Walker-Gordon Laboratories, the centralized control and processing organization, directs the operations and utilizes the products of decentralized agricultural units. These units consist of 125- to 175-acre farms operated on a personal incentive basis. It maintains laboratories for the producing and processing units; harvests and processes the crops to provide the desired diet for the cows; owns and maintains barns and equipment essential to the selection, care, breeding, and inspection of cows used for production of hygienic milk; and now has designed and constructed the "Rotolactor," which grooms and milks cows continuously.

This "Rotolactor" is located in its own two-story brick and tile building and is connected with the living quarters of the cows, nearly $\frac{1}{8}$ mile distant, by a covered runway. It consists of a revolving circular table 60 ft. in diameter on which 50 cows are mechanically washed, dried, and milked during one revolution of the turntable at the rate of four cows per minute. In operation, this table is continuously loaded as the cows in turn step from the runway into a stall on the slowly moving platform.



Government Approval for Labels Discussed

JUST how far the government can go in advising food manufacturers in advance as to the conformity of their labels with the federal food and drugs act was explained by G. W. Crawford, of the Food and Drug Administration of the Department of Agriculture, during the meeting of the Association of National Advertisers in Washington on Nov. 10. Mr. Crawford stated that while obviously it is impossible for the department to grant an advanced certification that a label complies with the act, if manufacturers accept the advice of the department, chance of future difficulty is exceedingly small. The number of products placed on the market by manufacturers who have failed to procure competent legal advice as to the labels is surprisingly large, he said.

Another phase of the work of the food and drug division discussed by Mr. Crawford was the publicity work undertaken to teach the public to read labels. Officials have been impressed, he stated, with the public response accorded radio talks now being broadcast by 25 stations on the wording of labels. A demand in excess of two million copies is expected for the bulletin now being prepared on the importance of reading labels. As a result of this educational campaign, Mr. Crawford maintained the food industry must prepare its labels to meet the new consciousness.

The workings of the Federal Trade Commission, with particular reference to the procedure followed in holding trade practice conferences, were explained to the assembled advertising men by William B. Humphrey, a member of the commission.

Whenever a sufficient number of persons or firms engaged in a certain business ask for it, a trade practice conference is called, Commissioner Humphrey stated. He made it clear that commissioners presiding over trade practice conferences can only give friendly advice, pointing out that it would be manifestly impossible for the commission to bind itself in advance, or to grant immunity.

The suggestion that the trade practice conference idea be applied to food manufacturers and others seeking counsel on labeling problems arose as a natural result of the two talks. In this manner, groups of food manufacturers faced with a common problem regarding labels on a new product could discuss the matter beforehand with officials of the Food and Drug Administration.

Although frank discussions of labels with manufacturers who want to look before they leap is welcomed, it was said that the limited staff of the division makes it difficult to hold a great number of conferences with individual manufacturers. Consequently, the national advertisers were told that the division would welcome a greater application of the general conference idea. Since the government men cannot suggest such conferences, the initiative must be taken by the industries concerned.

LAURENCE V. BURTON, formerly associate editor, appointed editor of "Food Industries" on Nov. 1

TRADE NOTES

FRED W. AMEND COMPANY, Chicago, Ill., has been upheld by the Commissioner of Patents in the right to use of the trademark "Chuckle." The suit followed an appeal from a similar ruling by the Examiner of Interferences on the part of Ward-Owsley Company, Inc., Aberdeen, S. D.

CAMPBELL SOUP COMPANY, Camden, N. J., is said to be contemplating the erection of a plant in Canada to avoid the 35 per cent Canadian import duty on canned soups that is now in effect, according to reports from the Toronto district.

CARRIER ENGINEERING CORPORATION, Newark, N. J., manufacturer of air-conditioning equipment, has completed arrangements for merging with the Brunswick-Kroeschell Company, maker of refrigeration systems, and the York Heating & Ventilating Corporation. All the companies involved will retain separate entities under a holding company to be known as the Carrier Corporation.

COCA-COLA COMPANY was denied a review by the Supreme Court of the United States of the recent adverse decision in its case against the Carlisle Bottling Works. The court had held that the latter company's trademark, "Roxa Kola," was not an infringement of the Coca-Cola name. The Circuit Court of Appeals, which made the decision, held that advertising had so "burned into the consciousness of people generally" the Coca-Cola name that everyone would note the dissimilarity.

GENERAL FOODS CORPORATION, through the institution department of General Foods Sales Company, Inc., has placed on the market a cream dessert in three flavors: vanilla, butterscotch, and lemon, for use in restaurants, hospitals, hotels, and for bakeries as fillings. The product will be known as Genesee Cream Dessert.

H. J. HEINZ COMPANY, Pittsburgh, Pa., commemorated its 61st year in business on Nov. 8 by the dedication of a new building devoted to social and recreational uses of the employees. More than 11,000 Heinz workers throughout the world sat down at the same time to a "radio banquet," at which the same menu was served to each of the participating groups, numbering over 100. Radio addresses by President Hoover, Howard Heinz, president of the company, and other industrial leaders were broadcast over a nation-wide hook-up.

KROGER GROCERY & BAKING COMPANY has transferred its pastry baking department from Cincinnati to Columbus, Ohio. At the same time the company transferred its coffee roasting department from Columbus to Cincinnati. Practically all the cakes and crackers sold in Ohio Kroger stores will, in the future, be baked at the Columbus plant.

LANGENDORF BAKERIES, INC., has opened in Seattle, Wash., the eighth in a series of bread and cake bakeries the concern operates on the Pacific Coast. The company is a subsidiary of Langendorf United Bakers, Inc., which operates plants in San Francisco, Los Angeles, and other California cities.

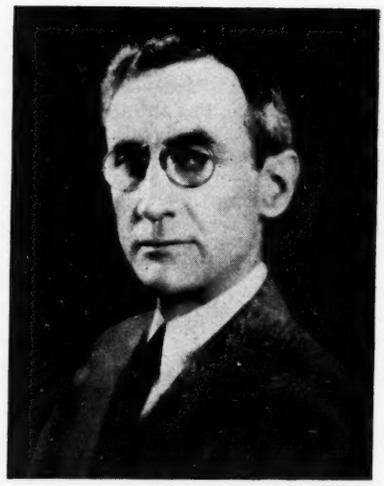
NATIONAL BISCUIT COMPANY is conducting negotiations for the acquisition of Wheatsworth, Inc., national distributor of biscuits and whole wheat flour, it was reported on Nov. 14. The proposed transaction would add assets of about $2,600,000 to National Biscuit. The main bakery of Wheatsworth, Inc., is located in New York City, and a flour mill is operated at Hamburg, N. J.

MIRROR, New York City candy manufacturer and retailer, has been reorganized by the election of a new board of directors. The new board consists of W. A. Simon, who will be president in the new alignment; Harry Eising, and Milton Weil for the preferred stockholders, and H. C. MacBride, and George M. O'Neil, secretary of Loft, Inc., for common stockholders. Mr. Simon was connected with the management of Mirror before it was absorbed by Happiness Candy Stores, Inc., in 1927. Happiness was recently acquired by Loft, Inc., and it was assumed that Mirror would also be directly controlled by Loft management, but the present action indicates a less coalescent connection.

NATIONAL DAIRY PRODUCTS CORPORATION recently acquired the R. G. Miller & Sons Company, Hartford (Conn.) dairy products concern.

REPETTI, INC., New York candy manufacturer, was recently merged with E. Greenfields Sons, Inc., Brooklyn, N. Y., and Walter M. Lowney Company, Inc., Boston, Mass. E. T. Bedford, of Repetti, Inc., has been made president of the merged organization, which will be known as Candy Brands, Inc.

STANDARD BRANDS, INC., New York City, is introducing six new brands of Chase & Sanborn bag and bulk coffee, which, with its dated coffee, will cover the entire popular price range.



H. C. PARMELEE, editorial director of McGraw-Hill publications, who resigns as editor of "Food Industries"

TORSCH-STEVENSON CORPORATION has been organized as a successor to Torsch-Summers Company, Baltimore (Md.) canning firm. F. A. Torsch is president in the new alignment, and C. D. Torsch and D. H. Stevenson are vice-presidents.

PERSONALS

LOT BOARDMAN, of W. S. Scull Company, Camden, N. J., was elected president of the National Coffee Roasters' Association at its recent convention in New York City.

THOMAS L. CHADBOURNE, chairman of the Chadbourne committee for the stabilization of the world sugar market, sailed on Nov. 21 to confer with European growers. The bill giving Mr. Chadbourne and DR. VIRIATO GUTIERREZ, president of the Cuban Senate, the right to make agreements restricting Cuban sugar output was recently approved by the Cuban government. The first conference is to take place on Nov. 29 in Amsterdam and the second on Dec. 4 in Brussels.

ALBERT H. DOOLITTLE was appointed secretary of the American Spice Trade Association at a special meeting of the board of directors held in New York City on Nov. 6.

COLBURN S. FOULDS, formerly with the Foulds Company, has recently joined the Joe Lowe Corporation, New York City, as manager of its noodle egg yolk department.

CHARLES H. GOUGH has been placed in charge of the ice cream research department of the Cary Maple Sugar Company, St. Johnsbury, Vt. Mr. Gough was formerly manager of the ice cream research department of Van Houten, Inc.

C. L. GUYMAN, vice-president of The Atlantic Coast Fisheries Company, returned from England on Nov. 25 on the S.S. "Homeric." Mr. Guyman's trip was occasioned by a co-operative fishing venture on the part of his organization and British interests. Under this arrangement, the S.S. "Northland" went to Greenland waters for halibut fishing equipped with a Piqué quick-freezing system. A catch of 1,200 tons of halibut and 600 tons of cod was reported.

HORACE HAVEMEYER has been elected a director of Standard Brands, Inc., the board of directors having been increased from seven to eight members.

ALBERT R. MANN, dean of the New York State College of Agriculture at Cornell University and director of the University Experiment Station, was recently awarded an honorary degree of Doctor of Laws at the University of California. Dean Mann went to the West to deliver the dedicatory address at the opening of Giannini Hall on the California University campus at Berkeley, a new building devoted to agricultural economics.

HARRY S. MASON, Los Angeles, Calif., has been made manager of the California Fish Canners' Association, San Francisco, Calif. Although Mr. Mason's former affiliations have not been with the fisheries industry, he has had considerable experience as an organizing executive.

PRESTON MCKINNEY, secretary of the Canners' League of California, left recently for three months tour of the Orient.

FRED RASMUSSEN, executive secretary of the International Association of Ice Cream Manufacturers, is making a trip to the Southern, Middle Western and Pacific Coast states. During the trip Mr. Rasmussen will address annual conventions of the state associations.

L. A. SCHILLINGER, formerly manager of the Baltimore (Md.) plant of the General Baking Company, has resigned to join Standard Brands, Inc., it was recently announced. Mr. Schillinger is well known to the baking industry, having been first vice-president of the American Bakers' Association for the past six years and a member of the executive committee of the American Institute of Baking.

HARRY STINER, of the National Biscuit Company, returned from Turkey on Nov. 9, on the S. S. "Vulcania." Mr. Stiner advised fig producers in maintaining standards required for figs imported by his organization.

W. G. WORMLEY, formerly in charge of the Mississippi operations of the Widlar Food Products Company, a subsidiary of Standard Brands, Inc., has been made general plant manager. He will transfer from Wiggins, Miss., to Cleveland, Ohio, on Dec. 1.

Named Vice-President

Underwood & Underwood

LEWIS W. WATERS, formerly assistant to the executive vice-president of General Foods Corporation, New York City, was elected vice-president in charge of research and development on Nov. 25. The advancement of the head of this department to the executive board was made in recognition of the importance of research and development work in the operations of the company. Mr. Waters was graduated from Massachusetts Institute of Technology in 1910, and taught there for several years. He was employed in food and biochemical research by the Campbell Soup Company, United Fruit Company, and E. I. du Pont de Nemours & Company, and in 1920 was made research manager of the Minute Tapioca Company, which was acquired by Postum Company, Inc., and that, in turn, by General Foods. He became assistant to the executive vice-president in charge of research and development in January, 1928.

OBITUARY

E. J. CLEAR, president and manager, and C. E. ROBINSON, in charge of fruit buying, of the Oregon Packing Company, Portland, Ore., were drowned in the Clearwater River near Lewiston, Idaho, on Oct. 19.

JAMES H. COOLIDGE, president of the James H. Coolidge Company and of General Dairy Stores, Inc., Cleveland, Ohio, was killed by carbon monoxide fumes in his garage on Nov. 10. He had been connected with the milk and ice cream business for more than a quarter of a century, having been executive vice-president of the Telling-Belle Vernon Company for a number of years. He resigned about a year ago to head his own company.

JOHN M. DANAHY, president of the Danahy Packing Company, Buffalo, N. Y., since 1913, died on Nov. 4 after a long illness. He was 64 years old.

MARTIN DAWSON, president of the Martin Dawson Company, Chicago, Ill., and one of the charter members of the National Confectioners' Association, died on Oct. 28 at the age of 86. He was the first secretary of the National Confectioners' Association, holding that office for seven years.

JOHN DEMAREST DE RONDE, New York City, for 30 years associated with the U. S. Bureau of Animal Industry, died suddenly on Nov. 15 at Hartsdale, N. Y. He was 65 years old and had been retired for four years.

HENRY A. FEHN, Scarsdale, N. Y., president of the Sweets Company of America, New York City, died on Nov. 25 following an operation for appendicitis. He was 42 years old. Mr. Fehn was a member of the executive committee of the National Confectioners' Association, and president of the Association of Manufacturers of Confectionery and Chocolate of the State of New York.

JULES JUNKER, prominent Philadelphia baker, died on Nov. 12 at Atlantic City, N. J. He was 72 years of age and a native of Alsace, France.

SAMUEL MERVIS, president of Samuel Mervis, Inc., Baltimore (Md.) mayonnaise manufacturer, died of pneumonia on Nov. 19. He was an active member of the Mayonnaise Manufacturers' Association, having attended the recent convention in Atlantic City, N. J.

RUFUS T. MULLIS, general manager and treasurer of the Banquet Ice Cream & Milk Company, Indianapolis, Ind., died several week ago. He was 61.

JULIAN MCKEE RIXFORD, pioneer California horticulturist, died at Palo Alto, Calif., Oct. 27. He was 92 years of age. Mr. Rixford brought the Smyrna fig to California in 1880, and also introduced the pistachio nut to that region. At the age of 70 he entered the service of the U. S. Department of Agriculture, from which he retired last year.

EDWARD H. SHIELDS, JR., of the Fleischmann Company Division of Standard Brands, Inc., was killed in an automobile accident at Orange, N. J., on Oct. 21. Mr. Shields was 33 years of age. He was a prominent member of the American Society of Bakery Engineers, having served as a member of the executive committee.

CHARLES E. SPENCER, Plainwell, Mich., chief soft-drink inspector for the state of Michigan, died on Oct. 26 after a short illness. He was 60 years of age and had been a member of the State Department of Agriculture for thirteen years.

FRANK VISSCHER, head of the Lyndonville Canning Company, Lyndonville, N. Y., died on Nov. 18 at the age of 59. Mr. Visscher was a well-known figure in the canning industry, particularly in the canning of applesauce.

New Construction

Bakery—Browne Realty Co., c/o H. Holder, 242 Franklin Ave., Brooklyn, N. Y., Archt., will soon award contract for a 1 story, 50 x 100 ft. bakery at Arlington Ave. and Third St., Newark, N. J. Estimated cost $40,000. Dugan Bros. Inc., 161 Arlington Ave., Newark, is lessee.

Bakery—Harris Baking Co., North St., Waterville, Me., will build a 2 story bakery on North St. Estimated cost $40,000. Private plans. Work will be done by separate contracts.

Bakery—S. Piantedosi, 83 Main St., Everett, Mass., awarded contract for the construction of a 1 story bakery on Main St. to Concrete Construction Co., 11 Garfield Ave., Chelsea. Estimated cost $40,000 to $50,000.

Bakery—Sussman Bros., 547 Grand Ave., Astoria, N. Y., awarded contract for the construction of a bakery at 25th Ave. and 45th St. to F. Benson, 2316 Broadway, Astoria. Estimated cost $40,000.

Bakery — Van de Kamps Holland Dutch Bakeries, Inc., 406 South Main St., Los Angeles, Calif., awarded contract for the construction of a bakery on Fletcher Drive to Pozzo Construction Co., 421 Macy St., Los Angeles. Estimated cost $350,000.

Bakery and Warehouse—S. Cole, 235 Bluehill Ave., Dorchester, Mass., awarded contract for a 1 and 3 story, 55 x 100 ft. bakery and warehouse to N. Fritz Construction Co., 62 Maywood St., Roxbury. Estimated cost $40,000.

Bottling Plant — Anheuser Busch Co., 721 Pestiozie St., St. Louis, Mo., plans to rebuild bottling plant recently destroyed by fire. Estimated cost to exceed $100,000. Private plans.

Bottling Plant—Coca Cola Co., Washington, Ind., awarded contract for a 2 story, 50 x 100 ft. bottling plant at Main and Second Sts., to Kretz & Zinkan, Washington. Estimated cost $40,000.

Bottling Plant—Pringle & Smith, Norris Bldg., Atlanta, Ga., Archts., will receive bids until Dec. 1 for the construction of a 2 story bottling plant at Swainsboro for Alabama Coca Cola Bottling Co., c/o J. Eros, Anniston, Ala. Estimated cost $85,000.

Brewery—Rubsam & Horrman Brewing Co., 191 Canal St., Stapleton, S. I., N. Y., will soon award contract for a brewery, ice manufacturing plant and storage building. Estimated cost $300,000.

Orange Crush Plant—L. Auclaire & Sons, 83 Broad St., Marlboro, Mass., plans to rebuild an orange crush plant on Elm St., destroyed by fire. Estimated cost $40,000. Architect not selected.

Canning Plant—Dorgan-McPhillips Packing Corp., Mobile, Ala., awarded contract for first unit of canning plant, 80 x 250 ft. at Columbia, Miss., to Dye & Mullings, Columbia.

Candy Factory — American Candy Co., 215 Broadway, Milwaukee, Wis., plans to rehabilitate power plant and manufacturing plant electrical and mechanical equipment. O. H. Henschel, 401 Commerce Bldg., Milwaukee, is consulting engineer.

Creamery—Challenge Creamery & Butter Co., 307 Montgomery St., San Francisco, Calif., received lowest bid for the construction of a 2 story creamery at 18th and York Sts. from Monson Bros., 475 6th St., San Francisco. $118,860.

Creamery—Lower Columbia Dairy Association, Astoria, Ore., c/o A. E. Engbretson, Secy., c/o Lower Columbia River Dairy Association, will receive bids about Jan. 1, for the construction of creamery, including separators, churns, refrigeration equipment, boilers, engines, pumps at 11th St. and California Way, Longview, Wash. Estimated cost $80,000.

Creamery—Yakima Valley Dairymen's Assn., Yakima, Wash., awarded contract for the construction of a creamery to The Austin Co., 16112 Euclid Ave., Cleveland, O. Estimated cost $50,000.

Dairy—College City Milk Co., Galesburg, Ill., plans remodeling building into modern dairy building at Mulberry and Chambers Sts. to E. A. Chalstran, 1474 North Seminary St., Galesburg. Estimated $50,000 to $75,000.

Dairy Plant — Industrial Realty Co., c/o Ballinger Co., 100 East 42nd St., New York, N. Y., Archts. and Engrs., will soon award contract for a 1 and 2 story diary plant at Fayette and Goodwin Sts., Perth Amboy, N. J. Estimated cost $40,000. Puritan Dairy Products Co., 683 New Brunswick Ave., Perth Amboy, is lessee.

Dairy — Liberty Dairy Products Corp., 6th and Forbes Sts., Pittsburgh, Pa., awarded contract for the construction of a dairy at Aurelia and Dennison Sts., to Nicola Building Co., 6388 Penn Ave., Pittsburgh. Estimated cost $150,000.

Dairy Plant—A. H. Merriman & Sons Inc., 34 Englewood Ave., Waterbury, Conn., is having preliminary plans prepared for the construction of a dairy plant on Hamilton St. Estimated cost $50,000. McCormick Co., South Negley Ave., Pittsburgh, Pa., is architect.

Dairy Plant Addition—Youngstown Sanitary Milk Co., 715 Erie St., Youngstown, O., will soon award contract for a 1 and 2 story, 43 x 121 ft. addition to dairy plant and 30 x 55 ft. power plant. Estimated cost $100,000. Braziell & Anderson, 309 Fowill Ave., Pittsburgh, Pa., are architects.

Dairy and Ice Cream Manufacturing Plant—Clover Farms Inc., 73 Sedgwick St., Bridgeport, Conn., plans the construction of a dairy and ice cream manufacturing plant. Estimated cost $200,000. Architect not selected. Electric refrigeration equipment will be required.

Ice Cream Plant—Steffens Ice & Ice Cream Co., First National Bank Bldg., Wichita, Kan., awarded contract for a 5 story, 101 x 120 ft. ice cream plant at Santa Fe and Rock Island Sts., to Armagost & Son, 3417 Edgemont Pl., Wichita. Estimated cost $300,000.

Ice Cream Manufacturing Plant — Peoples Fuel & Supply Co., subsidiary of Borden Farms Products of Illinois, 4921 South Racine Ave., Chicago, Ill., will soon award contract for an ice cream manufacturing plant. Estimated cost to exceed $300,000.

Ice and Ice Cream Plant—J. R. Newkumet, Norman, Okla., is having preliminary plans prepared for the construction of a new ice and ice cream plant. Estimated cost $40,000. Private plans.

Cold Storage Warehouse — Terminal Warehouse Co., 106 West Seeboth St., Milwaukee, Wis., awarded contract for concrete work for a 5 story, 62 x 120 ft. addition for cold storage warehouse to Selzer-Ornst Co., 444 State St., Wauwatosa.

Ice Plant—Borin Bros. Coal & Ice Co., 1635 Westminster Ave., Detroit, Mich., is having plans prepared for the construction of a 2 story ice plant 30,000 lbs. of dry ice daily capacity on Linwood Ave. Estimated cost $400,000. Private plans. Electric motors, etc. will be required.

Ice Plant—Canton Ice & Fuel Co., 1210 Third St. N. E., Canton, O., plans a 2 story addition to ice plant to double capacity. Estimated cost $50,000. Private plans. New machinery and equipment will be required.

Ice Plant—B. Gundlach, 101 Park Ave., New York, N. Y., is having plans prepared for the construction of an artificial ice plant near Corbin Pl., New Britain, Conn. Estimated cost $40,000. R. B. Engineering Corp., 11 West 42nd St., New York, are engineers.

Ice Plant—Louisiana Public Utilities Co., Lafayette, La., is having preliminary plans prepared for the construction of an ice plant at Crowley. Estimated cost $50,000.

Ice Manufacturing Plants—Western Ice & Utilities Co., M. M. Whitsett, Gen. Mgr., Donora, Pa., plans the construction of an ice manufacturing plant at Monessen, also plant at Charleroi. Latter will be built by day labor.

Fisheries Building—U. S. Bureau of Fisheries, Washington, D. C., awarded contract for a 2 story, 50 x 120 ft. fisheries building at Hamlin St. and Montlake Blvd., Seattle, Wash., to Western Construction Co., Seaboard Bldg., Seattle. Estimated cost $100,000.

Grocery Sales Room and Warehouse — Cash Grocery & Sales Co. Inc., Baton Rouge, La., will soon award contract for a 1 story, 98 x 106 ft. grocery sales room and warehouse building. Jones, Roessle & Olschner, Baton Rouge, are architects.

Produce Terminal—Pennsylvania R.R., Broad St. Station, Philadelphia, Pa., plans the construction of a produce terminal including refrigeration system, etc. at old Mount Vernon shops, North and Mount Royal Aves., Baltimore, Md. Estimated cost to exceed $600,000. T. J. Skillman, Philadelphia, is chief engineer. Maturity after Jan. 1.

Terminal Warehouse — Overland Terminal Warehouse Co., Los Angeles, Calif., awarded contract for a 6 story, 100 x 620 ft. warehouse including cold storage facilities, loading platforms, etc., at Ninth and Alameda Sts., to J. V. McNeil Co., 5860 Avalon Blvd., Los Angeles. Estimated cost $1,000,000.

Warehouse—Canadian National R.R., Montreal, Que., is having plans prepared for the construction of a large warehouse for handling fruit shipments, including cold storage facilities, etc. at Yonge St. and Esplanade Ave., Toronto, Ont. Estimated cost $200,000. C. S. Gzowski, Montreal, is chief engineer.

Sugar Refinery—American Sugar Beet Co., Denver, Colo., plans the construction of a sugar refinery at Winnipeg, Man. $250,000.

Flour Mill—Vitamin Milling Co. of Canada Ltd., 19 Melinda St., Toronto, Ont., awarded contract for the construction of a 59 x 60 ft. flour mill at Oshawa Harbour to T. B. Mothersill & Co., Simcoe St., Oshawa. Estimated cost $40,000.

Grist Mill — C. O. Doyle & Son (Victoria Mills) Truro, N. S., plans the construction of a grist mill. Estimated cost $20,000.

Grain Elevator — Missouri Pacific R.R. Missouri Pacific Bldg., St. Louis, Mo., will receive bids about Jan. 2, for the construction of a grain elevator, 2,500,000 bu. capacity to include 126 storage bins, etc. at Kansas City. Estimated cost $1,500,000. E. A. Hadley, St. Louis, is chief engineer. Continental Export Co., Merchants Exchange Bldg., St. Louis, is lessee.

Grain Elevator—North Dakota Terminal Elevator Association, c/o H. A. Bronson, Grand Forks, N. D., plans the construction of a grain elevator, 1,000,000 bu. capacity. Estimated cost $250,000.

Grain Elevator — Texas - Oklahoma Wheat Growers Assn., c/o J. F. Triplett, Plainview, Tex., plans the construction of a grain elevator at Kafir Switch between Tulia and Happy. Maturity 1931.

Grain Elevators—Dept. of Agriculture, Government of Poland, is having surveys made for the construction of a number of grain elevators at various locations. Estimated cost $1,000,000. MacDonald Engineering Co., 420 Lexington Ave., New York, N. Y., are engineers.

Packing Plant—Wilmington Packing Co. Inc., E. T. Murphy, Wilmington, Mass., awarded contract for rebuilding packing plant in Eames St., recently destroyed by fire., to Thomas Mulcare Inc., 66 Western Ave., Brighton. Estimated cost $40,000.

Packing Plant Addition—Circle Packing Co., 319 Winstanley Ave., East St. Louis, Ill., awarded contract for a 2 story, 50 x 100 ft. addition to packing plant to Fred Schmitt Contracting Co. Inc., 650 Rosedale Ave., St. Louis, Mo.

Packing Plant Addition—McArthur Packing Co., Hutchinson, Kan., will soon award contract for addition to and remodeling of packing plant Estimated cost $40,000. W. E. Hulse & Co., Hutchinson, are architects.

Packing Plant and Warehouse Buildings — Yuma Bonded Warehouse Co., Yuma, Ariz., has work under way on the construction of a packing plant and several warehouse buildings. Estimated cost $200,000. C. H. Trigg, Yuma, is engineer. Work being done by day labor.

Packing Plant (Citrus)—Alexander Marketing Co., 740 West Stenger St., San Benito, Tex., will soon award contract for the construction of a citrus packing plant at Raymondville. Private plans.

Packing Plant (Produce)—Etchison Produce Co., 595 Sam Houston Blvd., San Benito, Tex., will soon award contract for a 1 story, 48 x 200 ft. produce packing plant including cold storage facilities, etc. Private plans.

Packing Plant—Swift & Co., Packers and Exchange Ave., Chicago, Ill., acquired plant of White Provision Co. and plans alterations and additions at Howell Milk Rd., Atlanta, Ga. Estimated cost $40,000. Private plans. Work will be done by day labor and separate contracts.

Packing Plant Addition (Meat)—Karl Kreinberg and W. A. Krasny, 3310 West 65th St., Cleveland, O., had plans prepared for a 1 story, 40 x 150 ft. addition to meat packing plant. Estimated cost $40,000. L. Skolnik, Auditorium Garage Bldg., Cleveland, is architect.

Meat Plant — Cuauhtemoc Industries, Monterrey, Mexico, awarded contract for a 3 story building, meat plant to Rheiner & Kroeger, Builders Exchange Bldg., San Antonio, Tex. Estimated cost $175,000.

Poultry Warehouse — Poultry Producers of Central California, 700 Front St., San Francisco, Calif., are receiving bids for a 3 story warehouse at Sansome and Vallejo Sts. Estimated cost $150,000. H. G. Baumann, 251 Kearny St., San Francisco, is architect.

//

January and Beyond

January starts a new year, but a large part of FOOD INDUSTRIES for that month will be devoted to a review of this one. By chart and table the relation of 1930 to preceding years, in production, distribution, and consumption, will be set forth. Technological advances will be noticed in short editorial reviews. This brief review will be a good springboard from which the food manufacturer can dive into the sea of 1931 business competition.

Speaking of which, the last few months have proved again, if proof was needed, that it is the up-to-date in product, package, equipment, or methods that wins out when competition is severe. With this in mind, FOOD INDUSTRIES for January will devote sixteen pages to an exposition of the value of research to the manufacturer who wishes to keep his craft on an even keel, full-steam ahead.

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Lost...thousands of dollars in fractions of ounces!

"The old axiom that says an ounce of prevention is better than a pound of cure is particularly true in packaging. Even a fraction of an ounce waste or overweight per package or container can easily run into large sums lost yearly. We use Pneumatic Machines as a preventative against waste and inefficiency in packaging our product."

MR. HOYT R. SHEHAN
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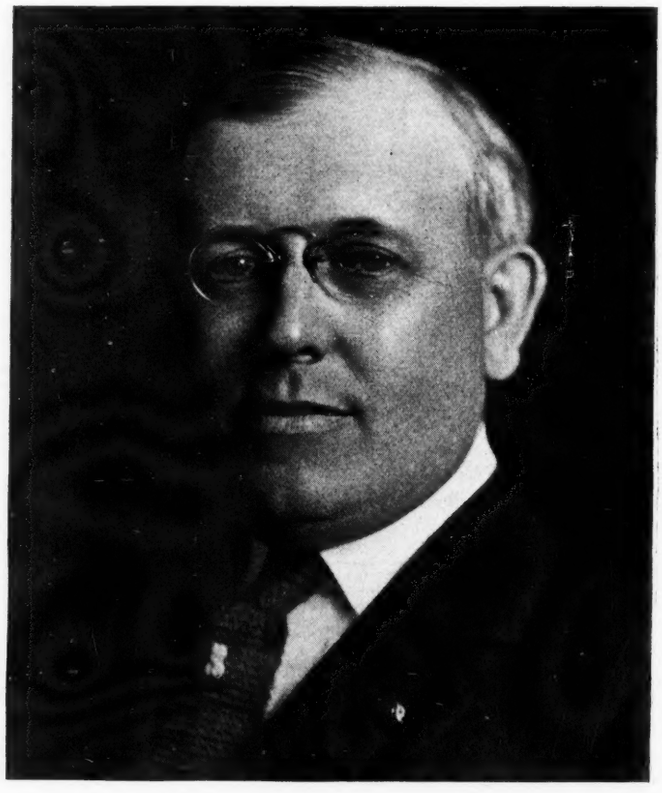


As Mr. Hoyt R. Shehan, Vice-President of the Wildroot Company, Inc., so aptly points out, there are few operations in your plant where profits can be lost more quickly than in packaging. A fraction of an ounce overweight, a slight waste in filling each bottle, package or container can easily run into thousands of dollars of lost profit yearly.

America's largest producers of packaged goods, have a method of avoiding waste and assuring the highest efficiency in their packaging operations—Pneumatic Machines. They find in Pneumatic Machines the ideal balance of speed, accuracy and dependable operation that they cannot duplicate by any other method.

Send for the book "An Interview." It gives you a concise yet all-inclusive picture of the Pneumatic Scale Corporation, its experience, accomplishments and ability to serve you.

PNEUMATIC MACHINES

Carton Feeders—Bottom Sealers—Lining Machines—Weighing Machines (Net and Gross)—Top Sealers—Wrapping Machines (Tight and Wax)—Capping Machines—Labeling Machines—Vacuum Filling Machines (for liquids or semi-liquids)—Automatic Capping Machines—Automatic Cap Feeding Machines—Tea Ball Machines.

PNEUMATIC SCALE PACKAGING MACHINERY

PNEUMATIC SCALE CORP., LTD., NORFOLK DOWNS, MASS.
Branch offices in New York, 26 Cortland St.; Chicago, 360 North Michigan Ave.; San Francisco, 320 Market St.; Melbourne, Victoria; Sydney, N. S. W. and London, England

One of a number of Autocars recently delivered to the American Stores Company in Philadelphia is this Model TEA Autocar Ranger. Its great, 6-cylinder Autocar Blue Streak engine will drive it 45.2 miles per hour under its full rated load. Its wheelbase is 192 inches. The full floating Autocar double reduction rear axle has 11 inches road clearance. Much of the beauty and comfort of this handsome truck are contributed by the Autocar de Luxe cab.

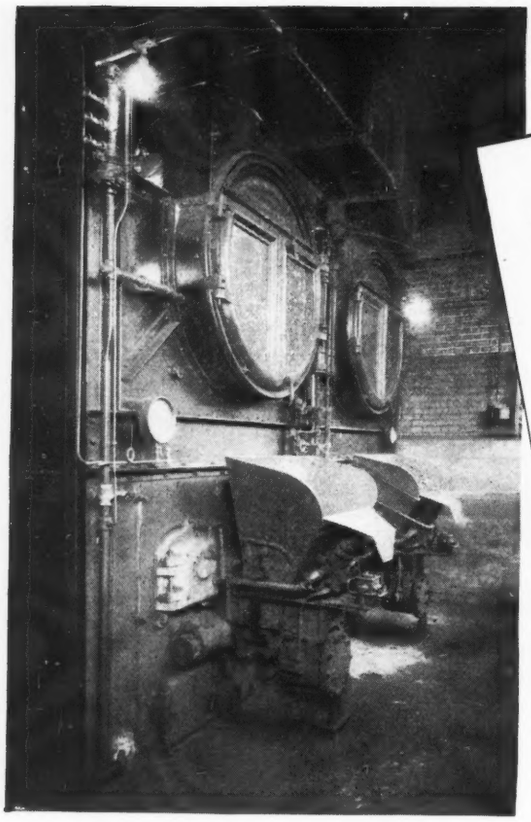
PRECEDENTS HAVE NO PLACE IN DISTRIBUTION METHODS

The distribution methods that were adequate a year ago are out of the picture today. Progress has made them obsolete. Those firms that cling to the old methods because they are established precedents soon find themselves trailing the van of modern business. The new era in food distribution demands motor trucks . . . but any motor trucks will not do. They must be the best motor trucks, designed specifically for the type of hauling characteristic of food distribution. » » » In such a system, the modern line of Autocars enjoys acknowledged leadership. The Autocar "Blue Streak" 6-cylinder engine, the Autocar frame, the Autocar rear axle . . . all precision-built to the highest standards in the industry . . . are maintaining and increasing Autocar's reputation as the truck that sets the pace for tomorrow's transportation methods. » » » Buy Autocars—and keep ahead of the procession.

PRECISION BUILT

AUTOCAR TRUCKS

THE AUTOCAR COMPANY, ARDMORE, PA.



View showing the Walsh-Weidner H.R.T. Boilers and the Type K Stokers installed at the Hazel Atlas Glass Co., Wheeling, W. Va.

HAZEL-ATLAS GLASS COMPANY

WHEELING, W. VA.

May 27, 1930.

Mr. R. L. Lindesmith,
Combustion Engineering Co.,
First National Bank Bldg.,
Pittsburgh, Penna.

Dear Sir:-

The two 125 H.P., C. H., Premier Boilers with Type K stokers purchased from you to replace the two cast iron, hand fired, sectional heating boilers and one vertical fire tube boiler for generating steam for process work, were placed in service at our Wheeling Plant during November of 1929.

We found upon making an analysis of the fuel costs for the first quarter of this year that during the first three months of 1929 we used 708.28 tons; during the first three months of 1930 we used 490.90 tons;- a difference of 217.38 tons.

We have by this installation accomplished,-

(a) a saving in fuel,
(b) The elimination of smoke
(c) and are able to maintain uniform steam pressure, which is important in heating and process work.

Yours very truly,

HAZEL ATLAS GLASS COMPANY

217 *tons less coal*

the first quarter of this year as compared with last year

Two Hundred Seventeen tons less coal for the first quarter of this year, as compared with the same period of last year, is a considerable reduction in fuel for firing two 125 hp. units.

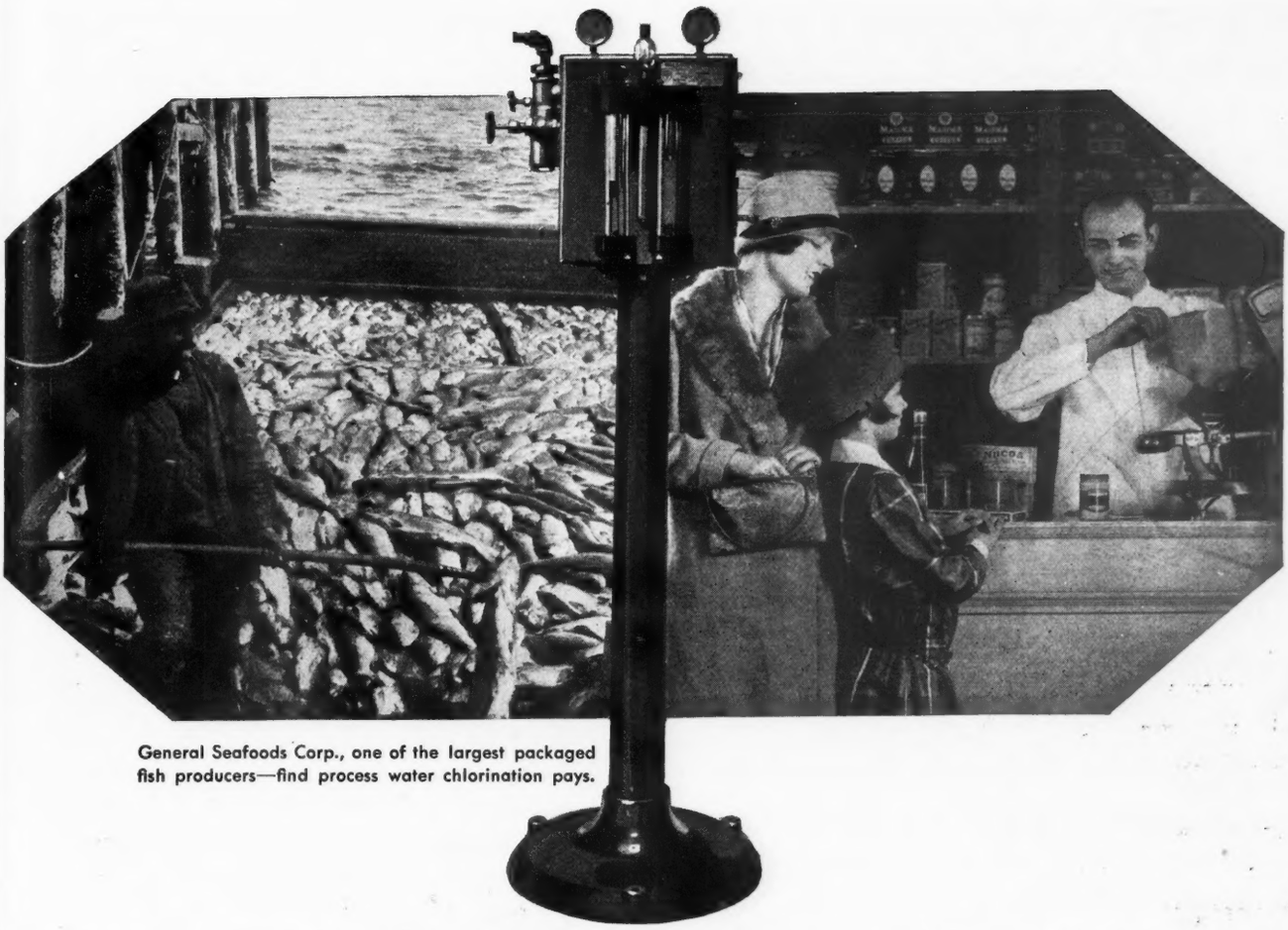
Combustion Engineering Corporation's fuel burning and steam generating equipment for small industrial plants, will effect savings just as worthwhile, in proportion to the steam generated, as for the large central station plants.

A catalog illustrating and describing the Type K Stoker (for boilers up to 200 hp.) is available and will be sent upon request.

COMBUSTION ENGINEERING CORPORATION

200 Madison Avenue — **New York, N. Y.**

Boilers - Air Preheaters - Stokers - Pulverized Fuel Equipment - Water-Cooled Furnaces



General Seafoods Corp., one of the largest packaged fish producers—find process water chlorination pays.

THIS QUESTION OF SPOILAGE

If you are keen to eliminate spoilage look to your process water. Is it contaminated?

If it is, it's a sure source of spoilage. But—it can be chlorinated and 50 cents a million gallons is a small premium to pay for absolutely pure process water.

Throughout the world two hundred million lives are safeguarded from water borne disease because of chlorination. Drinking water in over thirty-five hundred American municipalities is daily sterilized with W & T chlorinators.

Why not give your products and your customers this same protection?

We will gladly tell you how.

WALLACE & TIERNAN CO., INC.

Manufacturers of Chlorine Control Apparatus

NEWARK, N. J.

OFFICES IN PRINCIPAL CITIES

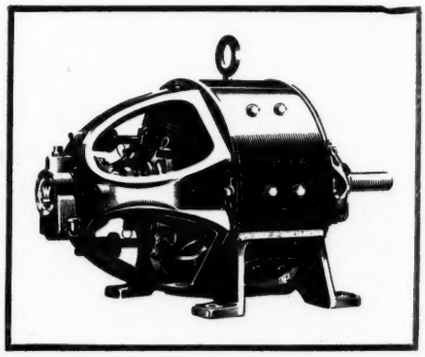
A Product of

WALLACE & TIERNAN

"The only safe water is a sterilized water"

1-2

. . . a pinch of salt

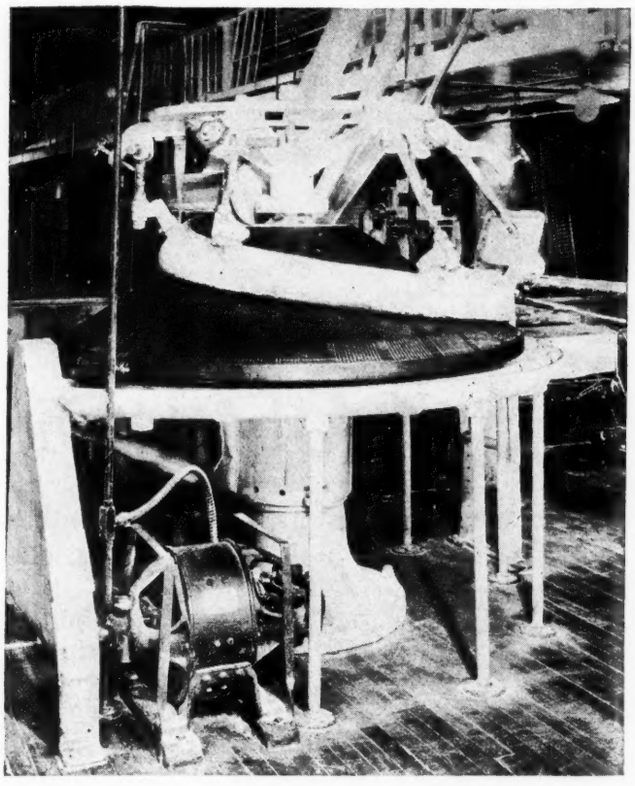


SYMBOLIC of that final delicate touch that distinguishes the product of the Master Baker.

Just as experienced bakers possess the skill to add that final touch of perfection, so Westinghouse engineers, with their years of experience in designing motors for all applications, also possess the skill and ability to add that desirable "pinch of salt" to Westinghouse motors.

In these motors you find features that assure cool operation; leak-proof, long-life bearings; complete absence of hot spots in the windings; and uniform insulation strength —features that you can find only in Westinghouse motors.

Ask the nearest Westinghouse office for complete information on these motors— the motors that are made better by a scientifically applied "pinch of salt".



Baker-Perkins Rounder equipped with a Westinghouse SK Motor. There are more SK Motors in use today than any other direct-current, general purpose motor.

Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

Westinghouse

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TUNE IN THE WESTINGHOUSE SALUTE OVER THE N. B. C. NATION-WIDE NETWORK EVERY TUESDAY EVENING.

THE JOHNSON FRICTION CLUTCH

THE

NEW SUPER JOHNSON

CLUTCH

HAS DISTINCT ADVANTAGES ADAPTABLE TO ANY PARTICULAR CLUTCH PROBLEM

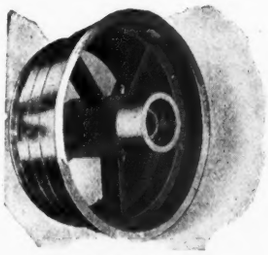
IN THE

FOOD INDUSTRIES

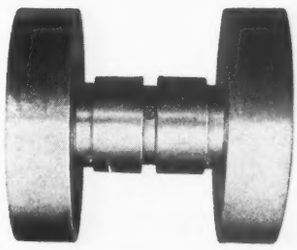
ECONOMY
FIRST COST is the LAST COST

SIMPLICITY
VERY FEW PARTS to THIS SUPER CLUTCH

SPACE SAVED
ONE SIZE As Small As 3 3/16 in. OUTSIDE DIAMETER



Three Step Cone Pulley on Clutch Hub.

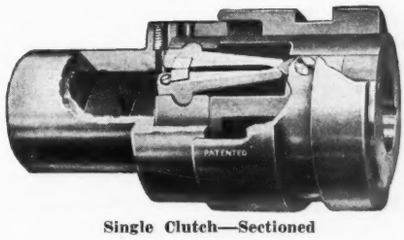


Double Clutch with Pulleys.

SAFE
PERFECTLY ROUND and SMOOTH NO PROJECTIONS

SATISFACTION
OVER 7500 USERS

POPULARITY
MACHINERY SALES ENHANCED



Single Clutch—Sectioned

The adjustment can't slip—it locks. Working parts of chrome nickel steel reduce trouble to the minimum. One point lubrication eliminates oil contamination of product. This Super-Clutch is neat, clean and adaptable to any particular clutch transmission problem in the Food Industry.

WIRE, PHONE Or

WRITE FOR CATALOG "F.I.—12"

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN

The Temperature "Robot" knows how and when to act

You have all heard about the Electrical Robot which answers the phone, turns out the lights, winds up the clock, etc. In the *Tycos* Recording Regulator you have another Robot—an automatic "man" which times your cooking, records the temperature, maintains the temperature at exactly the required point, and then in conjunction with the *Tycos* Time Regulator automatically shuts off the steam when the batch is done. *Tycos* Automatic Control is now used in many plants for widely varying applications. It eliminates variation in product, and in many cases results in a decided saving of labor costs. *Tycos* Regulators can control the complete cycle on a battery of cookers with no attention other than filling and emptying the cookers and setting the control initially.

Better let us give you complete information.

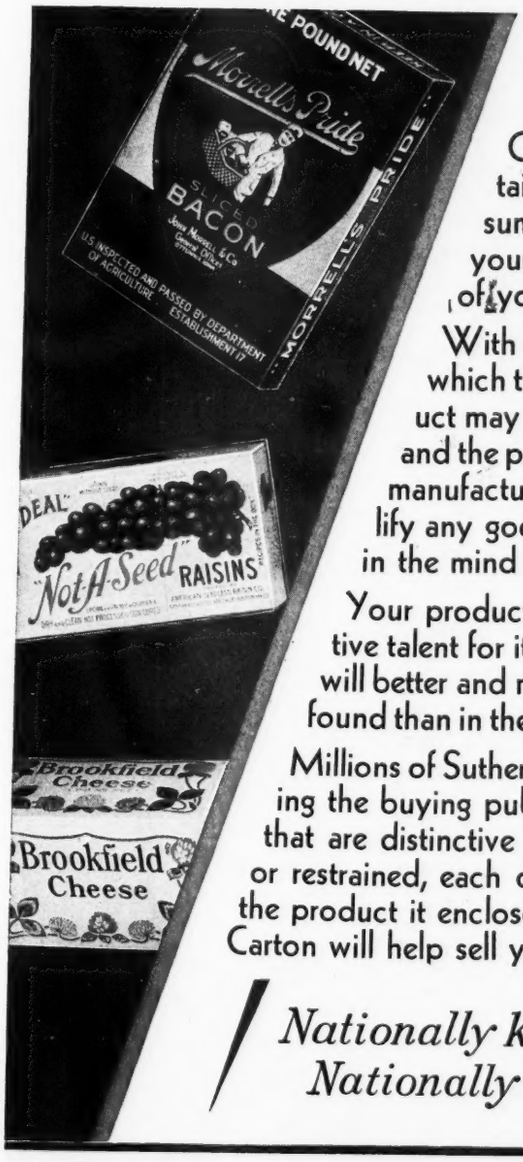
Taylor Instrument Companies

ROCHESTER, N. Y., U. S. A.

Canadian Plant, *Tycos* Building, Toronto

Manufacturing Distributors in Great Britain, Short & Mason, Ltd., London

YOUR PERSONAL REPRESENTATIVE



Only through your package do you obtain really intimate contact with the consumer of your product. It is, in effect, your personal representative in the home of your ultimate customer.

With it you can create an impression on which the success or failure of your product may rest. It can reflect all the quality and the painstaking care that goes into the manufacture of its contents or it can nullify any good impression already created in the mind of the consumer.

Your product deserves the best of creative talent for its package. And nowhere will better and more experienced talent be found than in the Sutherland organization.

Millions of Sutherland cartons are attracting the buying public every year, cartons that are distinctive and unusual, colorful or restrained, each designed to suit best the product it encloses. A Sutherland Carton will help sell your product.

Nationally Known
Nationally Used

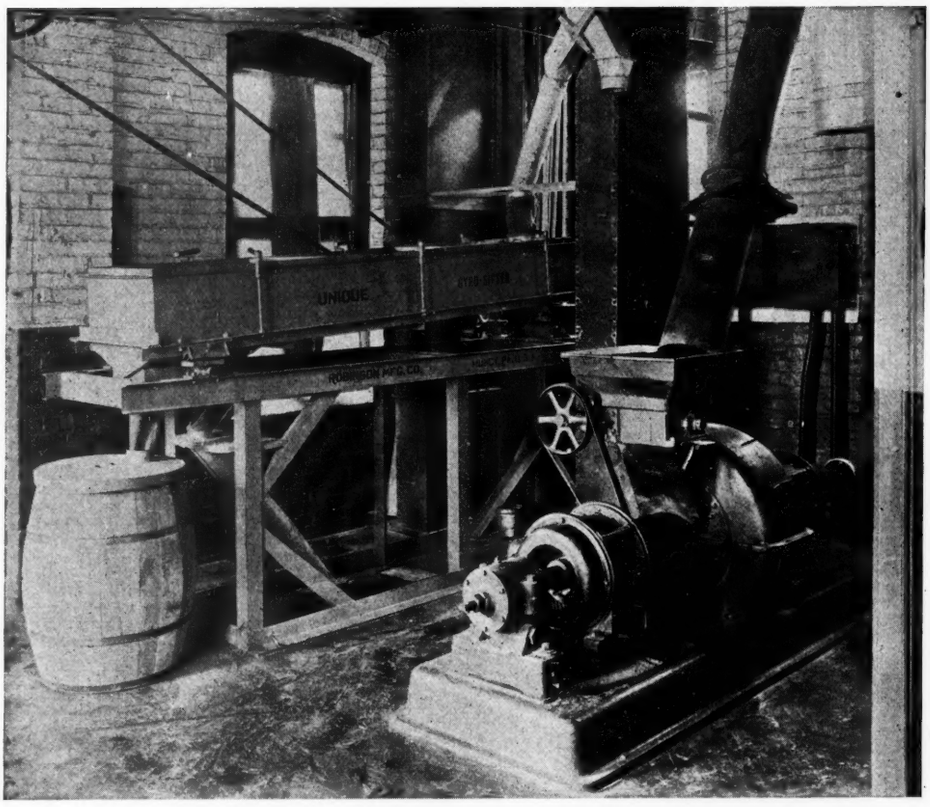
SUTHERLAND CARTONS

SUTHERLAND PAPER CO. KALAMAZOO, MICHIGAN

BOOST PROSPERITY

BUY NOW

BUT BUY WISELY



SPICES

Here's an efficient combination . . . a small Unique Attrition Mill and the Unique Gyro-Sifter . . . used for grinding and sifting various kinds of spices.

The Mill can be set for extremely fine to coarse grinding, while in operation, by a simple turn of a hand wheel. The Gyro-Sifter makes any desired number of separations and maintains close uniformity in all sizes. Good team-work—trouble-free, labor saving, entirely automatic up to the disposition of the finished products.

ROBINSON PRODUCTS

Crushers, Grinders, Pulverizers, Sifters, Mixers (Unique and Gardner), Elevators, Conveyors, Sheet Metal Tanks, Bins and Hoppers, Power Connections, Mill Supplies.

ROBINSON SERVICE

We offer you a complete Engineering, Experimental and Advisory Service.

You may not grind spices; but you should know about

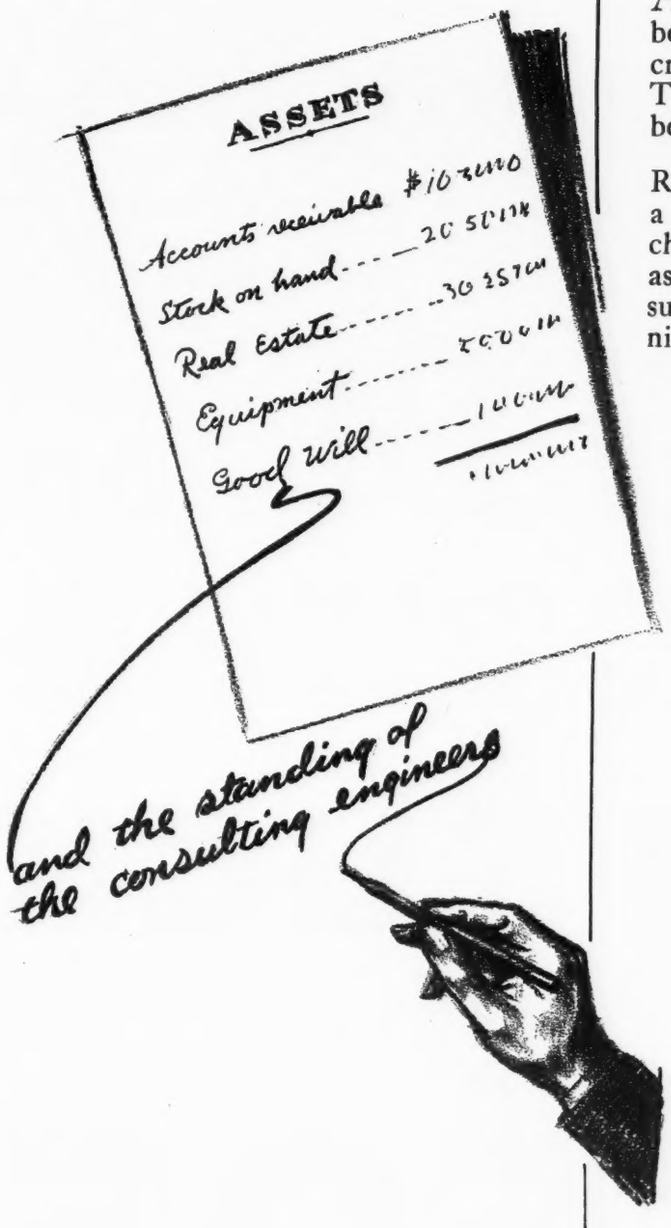
UNIQUE ATTRITION MILLS AND GYRO SIFTERS

if you grind or sift food products of any kind. We are prepared to show how Unique equipment can better your product or lower your processing costs—or both. Write us. Put your production problems squarely up to us. We can show you the answer, and prove it.

ROBINSON MANUFACTURING CO.

71 Painter Street, Muncy, Pa.

A contract with us establishes *credit*



ABILITY to meet intense competition is being emphasized these days by bankers, credit men and business men generally. Technical as well as financial resources are being carefully appraised.

Recently one of our clients was negotiating a large contract for its needs of a certain chemical through 1931. The seller wanted assurance that the purchaser could carry on successfully a business of the extremely technical character in which it was engaged.

Right here we entered into the picture, for when the treasurer of the seller's organization learned that we were in charge of the development and manufacturing operations as consulting engineers—and that our contract with this client had three years to run—credit was quickly granted on the terms our client requested.

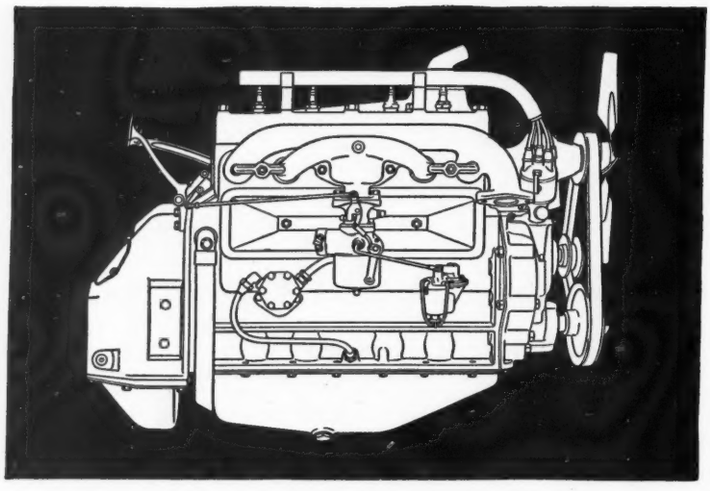
Does your technical staff command this kind of respect from those with whom you do business? Does its head meet your own executives and the executives of other companies on an equal footing?

A connection with a reputable firm of consultants will help answer these questions satisfactorily to you as well as to those who appraise your technical resources as a basis for extending credit or doing business.

The outside viewpoint can be an asset to your business for it is a valuable means of getting at the inside of every problem—in processes, and production as well as in credit.

WEISBERG & GREENWALD
ENGINEERS ~ CHEMISTS
71 WEST 45TH St. New York

Compare.. this 48-horsepower engine—



1½ ton DODGE TRUCK

SEE THIS NEW TRUCK. INSPECT THE 48-HORSEPOWER TRUCK ENGINE. NOTE ITS MODERN DESIGN, ITS STURDINESS. ASK WHY FULL FORCE-FEED LUBRICATION INSURES LONGER LIFE, GREATER ECONOMY AND DEPENDABILITY. ASK WHY ALUMINUM ALLOY PISTONS, EXTRA LARGE WATER AREA, RIGID CRANKSHAFT, PRECISION BEARINGS, AND CRANKCASE VENTILATION CONTRIBUTE TO SMOOTH, QUIET, LOW-COST OPERATION.

INSPECT, TOO, THE FULL-FLOATING REAR AXLE, RUGGED 4-SPEED TRANSMISSION, 4-WHEEL INTERNAL HYDRAULIC BRAKES AND MANY OTHER NOTEWORTHY FEATURES OF THIS NEW 1½-TON TRUCK. BUY IT COMPLETE WITH STANDARD OR SPECIAL BODY.

$595

CHASSIS F.O.B. DETROIT. DUAL REAR WHEELS AT SLIGHT EXTRA COST

DODGE TRUCKS RANGE IN PAYLOAD CAPACITIES FROM 1,200 TO 11,175 POUNDS

BROMO SELTZER Kept Pure by American Air Filters

Bromo Seltzer is assured of the two first requisites of a food or drug—a clean product and a sanitary package. The air that comes in contact with Bromo Seltzer is cleaned by American Air Filters. The bottles it is put up in are dried in filtered air.

That is the way the Emerson Drug Company insures an absolutely pure, clean product—one that builds prestige year after year.

In the drying ovens of the Bromo Seltzer laboratories, is a 12-unit battery of American Air Filters of the unit type, protecting the proportioned and mixed ingredients of Bromo Seltzer from the dust contamination that otherwise would result from the air drawn into the dryers. This battery has an air filtering capacity of 7,200 c. f. m.

After the bottles are washed in water at a temperature of 200°F., they are dried in an oven to which an average of 4,800 c.f.m. of filtered air is supplied by a 9-unit battery of American Air Filters, assuring absolute cleanliness of finished product when received by the consumer.

HOW STEALTHILY

DUST GETS A FINGER IN YOUR PIE

MIDWEST TRADE MARK Reed Air TRADE MARK filters ALL METAL NATIONAL AIR FILTERS TRADE MARK

The products formerly manufactured under the above trade marks are now combined in:

AMERICAN AIR FILTERS

No matter what your particular "pie", dust loves to get his finger under the crust. Furtively he creeps into your building, your product, your machinery, your school, your employee efficiency, as quietly as he might slip in the kitchen window on the rays of the sun and settle unnoticed into an actual pie sitting on the table. You open your pie and there he is. For instance:

STEEL MILL *Saves $35,000.* Dust deposits in the generator ducts and windings made it unsafe to operate the turbo-alternators in a large steel mill at more than 85% of their rating. After installing air filters, continuous operation under full load became possible giving additional capacity worth $35,475 a year.

A SCHOOL *Decreases Absenteeism.* A school installed a new ventilating system, including air filters, and reduced absenteeism 13.8%.

MANUFACTURER *Prevents Contamination.* A large gelatine manufacturer says, "It is doubtful whether we could have maintained our present volume of business if we had continued to use unfiltered air. Whereas we had little control over contamination, we can now assure users of a uniformly clean gelatine."

Now, or before you know it, dust may have a finger in your pie. Air filters that pay for themselves in an average of three years or less will prevent the intrusion of dust at once and permanently. Send the coupon for details. No obligation. AMERICAN AIR FILTER COMPANY, Louisville, Ky., and Bradford, Pa.

American Air Filter Co., *Incorporated,* 117 Central Ave., Louisville, Ky.
Please send literature on the uses of modern air filters.

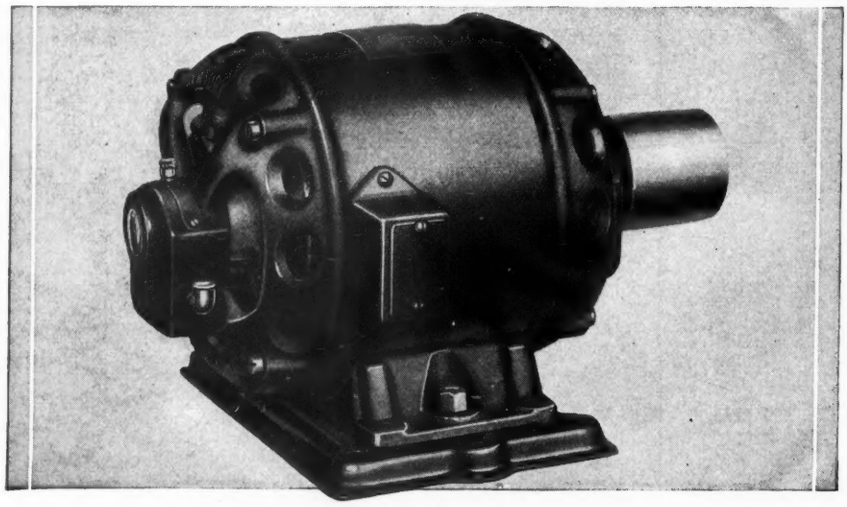
Use in which interested_____

Name_____

Street_____

City_____ State_____

THEY KEEP A-RUNNING



¼ Horse Power Century Type RS Repulsion Start Induction Single Phase Motor

Exclude Dust and Dirt
Protect Bearings Against Abrasive Wear

The bearing housings of Century Sleeve Bearing Motors are protected against the entrance of dust, dirt, and abrasive particles by brass dust caps and collars, which make the housings as nearly dust-tight as it is possible to build them.

Additional protection is afforded by the Century Wool Yarn System of Lubrication—which is standard equipment on all 1 horse power and smaller size sleeve bearing motors. The use of continuous unbroken strands of pure yarn assures complete filtering of the oil before delivery to the bearing surfaces, and permits at least one year's 24 hour per day operation without re-oiling.

Type RS motors are built in all standard sizes from ⅛ to 40 horse power.

CENTURY ELECTRIC COMPANY
1806 PINE ST. • • ST. LOUIS, MO.
40 U. S. and Canadian Stock Points and More Than 75 Outside Thereof

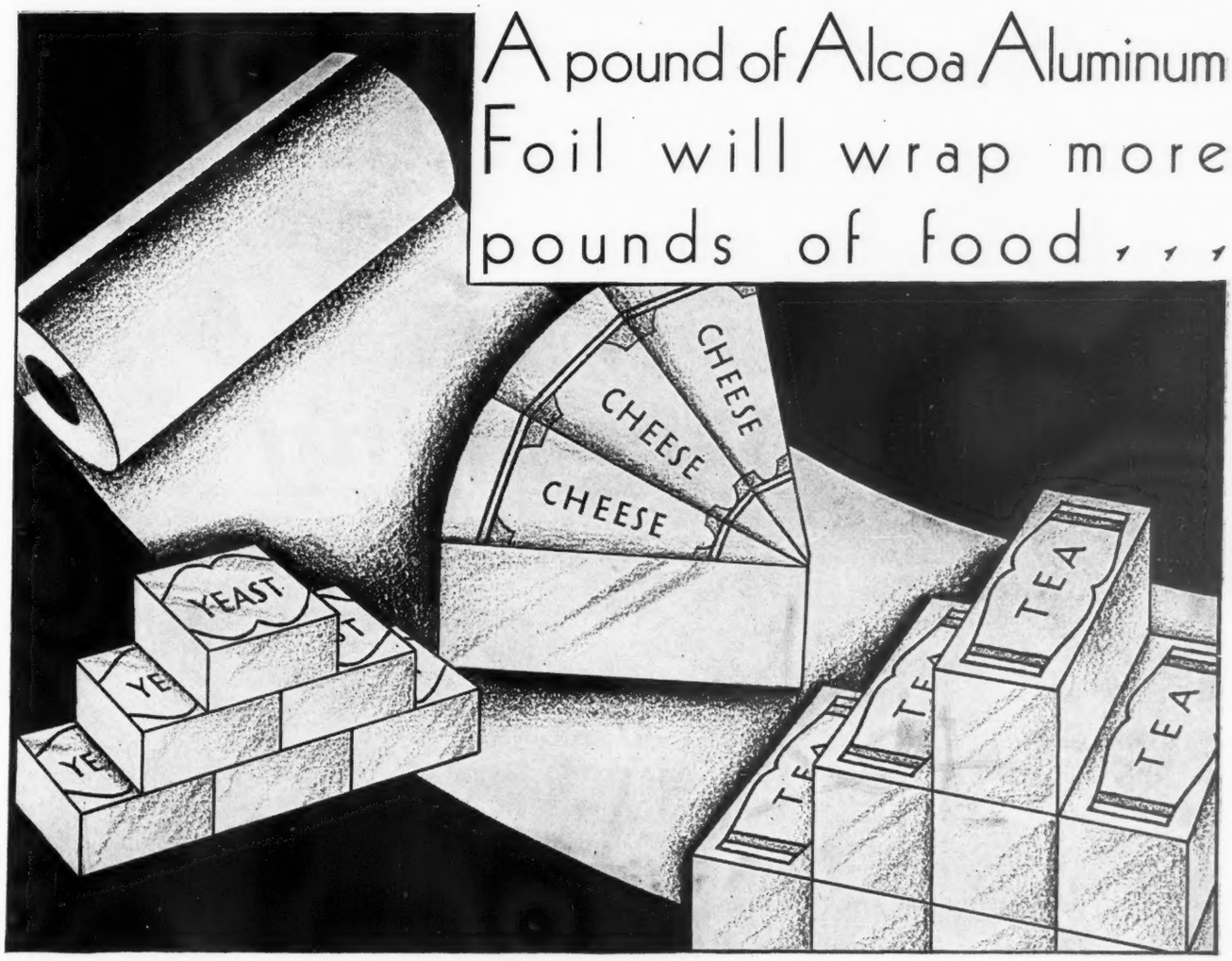
SINGLE PHASE, THREE PHASE, AND DIRECT CURRENT MOTORS

Century MOTORS

MOTOR GENERATOR SETS, ROTARY CONVERTORS, FANS AND VENTILATORS

612

FOR MORE THAN 26 YEARS AT ST. LOUIS



Alcoa Aluminum Foil has a greater covering area than any other metal foil. A pound of it will wrap a great many more packages of your product.

This wrapper is not brittle. It has great tensile strength and is easy to use in either machine or hand wrapping operations.

On the dealer's shelves, your package will attract the eye if it is wrapped in Alcoa Aluminum Foil. This wrapper never loses its bright lustre. You may prefer Alcoa Aluminum Foil in the natural aluminum, or you may have it lacquered, embossed or printed in any design and color.

In the consumer's kitchen your products will be fresher and taste better because Alcoa Aluminum Foil bars moisture and temperature change—preserves the delicate flavor of the many different types of foods it wraps.

Our nearest office will gladly give you complete information. Address ALUMINUM COMPANY *of* AMERICA; 2403 Oliver Bldg., PITTSBURGH, PA.

ALCOA

ALUMINUM

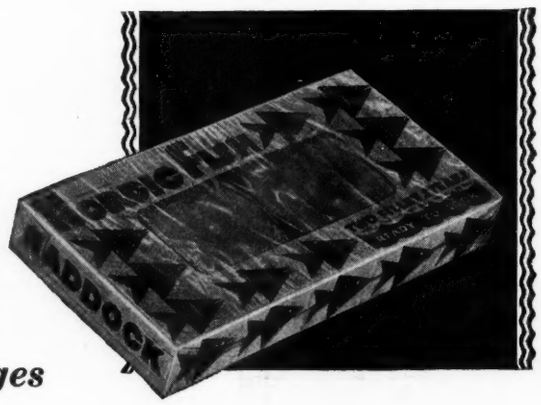
ALCOA ALUMINUM

ROLLED INTO FOIL

NEW

Tight-seal Wrapping

with moisture-proof Cellophane



Moisture-proof Cellophane can now be wrapped as air-tight as waxed paper, giving equal protection to the goods, and *decided sales advantages*

Now you can have *all* the sales advantages of a completely transparent wrapping, *plus* the air-tight, moisture-proof protection formerly obtainable only with waxed paper.

The Package Machinery Company, backed by wide experience in working with Cellophane, can now supply machines to wrap moisture-proof Cellophane as air-tight as waxed paper.

Moisture-proof Cellophane, being perfectly transparent, gives much more effective display to the package or product than waxed paper. Its glistening surface does not become clouded with dust . . . goods wrapped in it are always fresh in appearance; never shop-worn.

Tests show that moisture-proof Cellophane, wrapped by the *Tight-seal* method, helps to retain *flavor* and *fragrance* more effectively than either waxed paper or foil . . . important for such products as coffee, chewing gum, cake, perfumed soaps, etc.

This new development offers a real opportunity to that large field of manufacturers whose products must be kept fresh and wholesome . . . an opportunity to secure, in addition to perfect protection, a new and powerful sales-appeal through richer, more attractive appearance.

Send us your product

We will return it to you, in a *Tight-seal* moisture-proof Cellophane wrapping with complete information regarding the machinery to do the work.

PACKAGE MACHINERY COMPANY
Springfield, Massachusetts

New York Chicago Los Angeles
London: Baker Perkins, Ltd.

PACKAGE MACHINERY COMPANY

Over 150 Million Packages per day are wrapped on our Machines

"An unnecessary expense? . . . Not when Fisher Quality must be maintained"

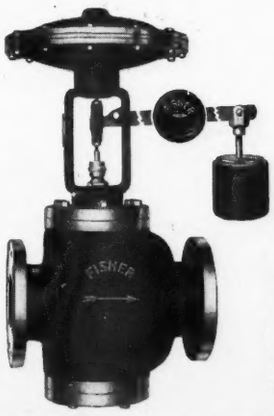
"IT IS an expensive operation but nevertheless a very necessary one. . . . if we are to continue to give you valves that we can guarantee to be tight under the operating conditions you specify.

"If the double disc inner valve were ground in at room temperature instead of at operating temperature, the difference in expansion of body metal and disc metal would tend to unseat one of the discs when the specialty is in operation. As you see, each valve is carefully ground in by hand at the specified operating temperature.

"The testing is also done at the specified operating pressure and temperature. A valve that is tight at room temperature is not necessarily so when you get it in a hot line.

"There are many operations that others might regard as 'unnecessary expense' but that we know are good reasons why you have never had trouble with Fisher Specialties."

THE FISHER GOVERNOR COMPANY
2100 Fisher Building **Marshalltown, Iowa**



The Fisher Type 10 Pressure Regulator is widely used for reducing the pressure of steam, air, oil and other fluids. It is particularly well suited to low reduced pressure service. It is simple in design and dependable in operation—there are no pistons and no dashpots to stick as a result of scale or corrosion.

FISHER

the mark of scientific fluid control

IN this era of highly competitive buying, the container more and more takes its place as a powerful agent to win sales. The dozen and one questions that come up about packaging your product all lie within the scope of the services Canco renders to its customers. By doing business with the American Can Company you place your packaging questions in the hands of an experienced, aggressive company—an organization that has played an important part in the development of the present day trend to conveniently sized and modern containers.

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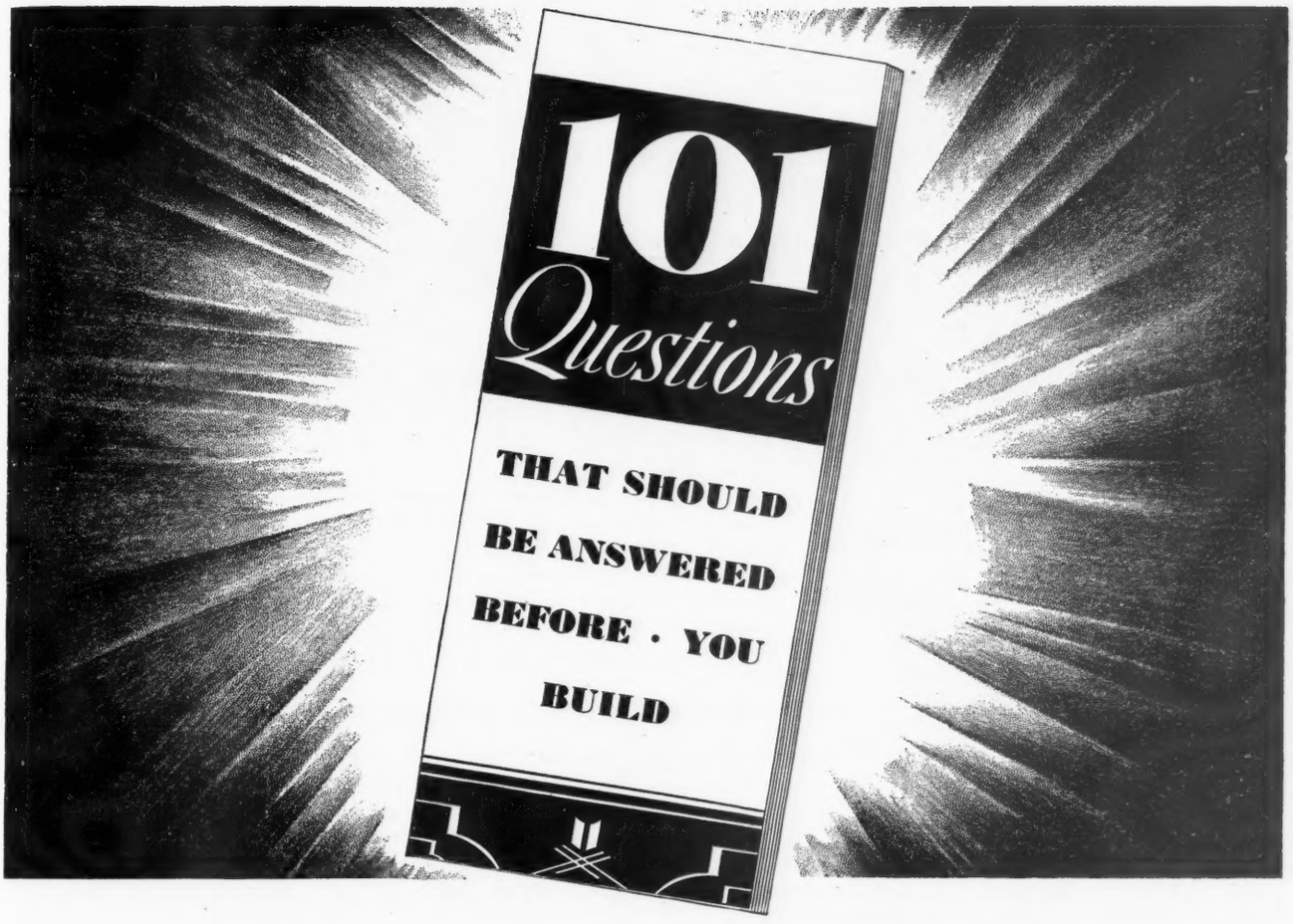

■ **You may or may not be in the market for a new food plant. Maybe you think you don't need a new one, *but actually do!***

This booklet of "101 Questions," intended primarily to help the manufacturer who is face to face with a building project, also raises questions, the answers to which are important to many manufacturers who have new building operations farthest from their minds.

The correct answer to the 1st, 10th, or 33rd question of the "101" is the solution to many *profitless business situations* in industry today.

Just recently Austin was awarded the design and construction of the world's first windowless factory—a $1,500,000 plant. Question 58 introduces one of the factors which led to this revolutionary step.

Ideas are the life blood of industry. A single idea from this booklet may mean much to you. A personal copy is yours for the asking. Wire, phone or write—no obligation, of course.

THE AUSTIN COMPANY

Engineers and Builders **Cleveland**

NEW YORK CHICAGO PHILADELPHIA NEWARK DETROIT CINCINNATI
PITTSBURGH ST. LOUIS SEATTLE PORTLAND
THE AUSTIN COMPANY OF CALIFORNIA, LTD.: LOS ANGELES, OAKLAND AND SAN FRANCISCO
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THE AUSTIN METHOD

Memo to The Austin Company, Cleveland—☐ You may send, marked for my personal attention, a copy of "101 Questions," without obligation. We are interested in a..... project..... sq. ft.

Individual..... Firm..... City..... F.I. 12-30

NIROSTA

TELLS YOU NOW

TIME WILL TELL YOU LATER

WHY wait until your competitor adopts Nirosta and brings out a product that looks better, lasts longer or costs less than yours? Nirosta is the metal of the hour that is inspiring industry, commerce and architecture. Nirosta sales have doubled in twelve months. The licensees, now 49, comprise the best experience and bulk of the tonnage in electric furnace steels.

And Nirosta Is Different

—primarily because of the Krupp heat treatment (high temperature) and analyses, which insure valuable, unduplicated properties that are evidenced by the results obtained in some of the country's greatest industrial laboratories and in many of the most important oil, chemical, industrial and architectural applications during the past year.

Neither time nor tide—not even the ravages of chemical attack—affect Nirosta, for it is completely and uniformly austenitic.

Any one of the licensees—or Nirosta headquarters—can give you information **now** which you are apt to obtain in a more expensive way later on.

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PRODUCED IN AMERICA UNDER KRUPP NIROSTA LICENSE WITH COÖPERATION OF THE KRUPP RESEARCH STAFF

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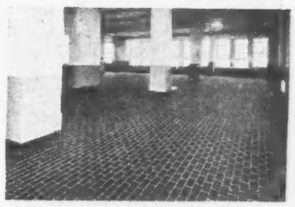
"NIROSTA" AND THE INTERLACED TRIANGLES ARE THE TRADE-MARKS FOR HIGH-CHROMIUM NICKEL STEEL ALLOYS PRODUCED UNDER PATENTS OF KRUPP NIROSTA COMPANY, INC.

Duratyle is a new, better, cleaner, safer, more reliable, more durable floor brick. It has a hard, smooth, non-porous surface that will last for years —that cannot be injured by acids or alkalies, oils or grease, water or steam.

. . . BETTER FLOORS

Duratyle is the ideal flooring for the canning factory. It is impervious to moisture, easy to keep clean, a safe flooring that provides a sure footing for machine operators.



Abbotts Dairies
Philadelphia, Penna.

. . . SANITARY FLOORS

Duratyle is particularly advantageous in freezing, hardening or cold storage rooms—below zero temperatures cannot injure it. Duratyle is durable even under the most severe conditions of service.

John J. Felin Co., Inc.
Philadelphia, Penna.

. . . DURABLE FLOORS

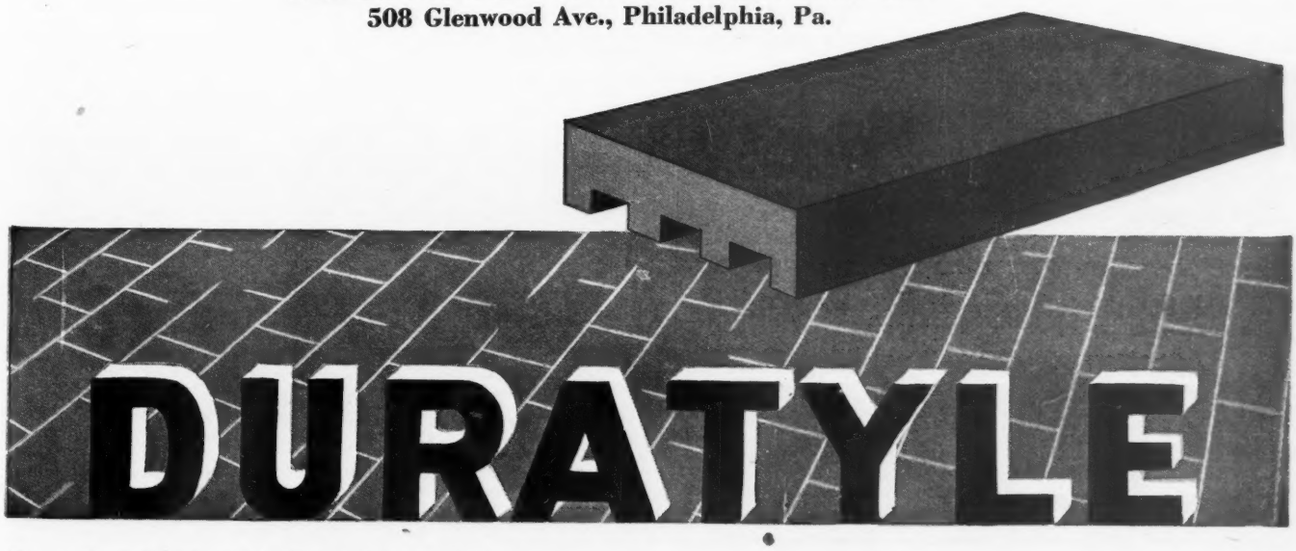
Duratyle can be laid over existing floors, on a thin bed of cement mortar. Can be used also for wall tile, base-boards, wainscoating, wherever a hard, tough, sanitary surface is required.

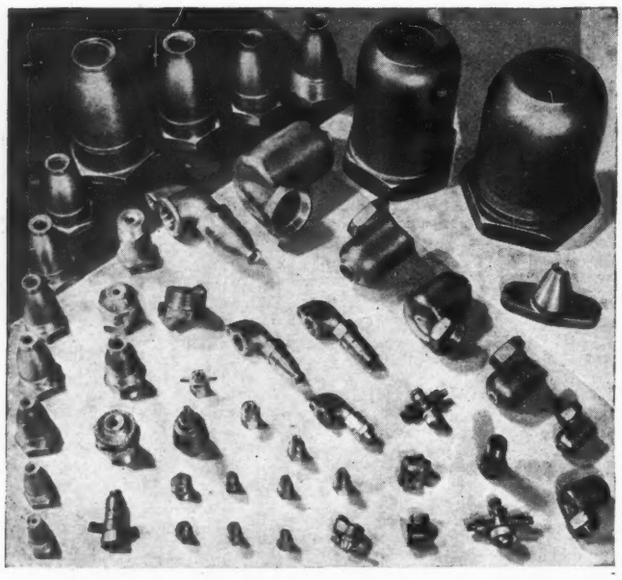
ECONOMICAL FLOORS

Let us show you what Duratyle is doing in service, under conditions similar to your own. Let us send facts and figures to help you form true cost comparisons. Write us.

S. Sklaroff & Son
Philadelphia, Penna.

DREHMANN PAVING & CONSTRUCTION CO.
508 Glenwood Ave., Philadelphia, Pa.





Spraco Nozzles for the food industries

2-fluid nozzles for intimately mixing two liquids or a liquid and a gas; ramp bottom nozzles for handling (without clogging) liquids containing rubbish or impurities; standard types for every job from powdering milk to spraying asphalt or cake frosting; special types developed to meet specific conditions.

Chemical engineers have found it to their advantage to be familiar with Spraco nozzles. Made in many sizes from brass, bronze, stainless steel, stoneware and special alloys, the line is the most complete one available. Send the coupon below.

SPRACO, INCORPORATED

Formerly Spray Engineering Company

124 Central Street, Somerville, Massachusetts

Please send Bulletin 463 describing the complete line of Spraco nozzles, including tables of capacities.

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Firm .....

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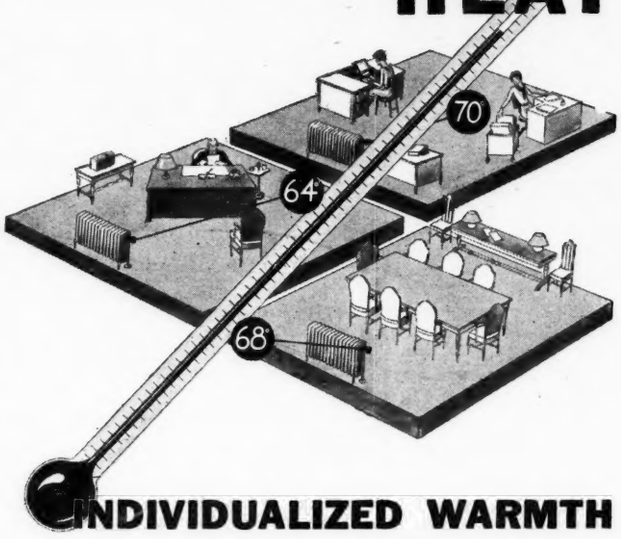
"Made to Measure" HEAT



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Sylphon Automatic Radiator Valves assure a better general heating for any building—because they prevent fluctuating room temperatures, one common cause of fuel waste. The Sylphon Automatic Radiator Valve is made to do just one job—and does it. Sensitive to the slightest temperature changes of the surrounding air—it steadily holds the warmth of any one room at exactly the degree most satisfactory to the occupants. Once its marked thermostatic head is set at "Hot," "Medium," or "Cold" there the temperature stays. Practically the entire thermometer range of comfort may be scaled for the individual warmth selection and once set all further radiator attention is avoided. Sylphon Automatic Radiator Valves positively eliminate uneven, injurious and wasteful heat for Factory, Office Building, Apartment or Home.

A COMPLETE RADIATOR CONTROLLING DEVICE

The Sylphon Automatic Radiator Valve is a combination packless valve and temperature control unit. Its motor element is the dependable Sylphon Bellows. It has no electrical or mechanical accessories to get out of order. Easily installed and inexpensive—architects and engineers specify it with full confidence in its lasting efficiency.

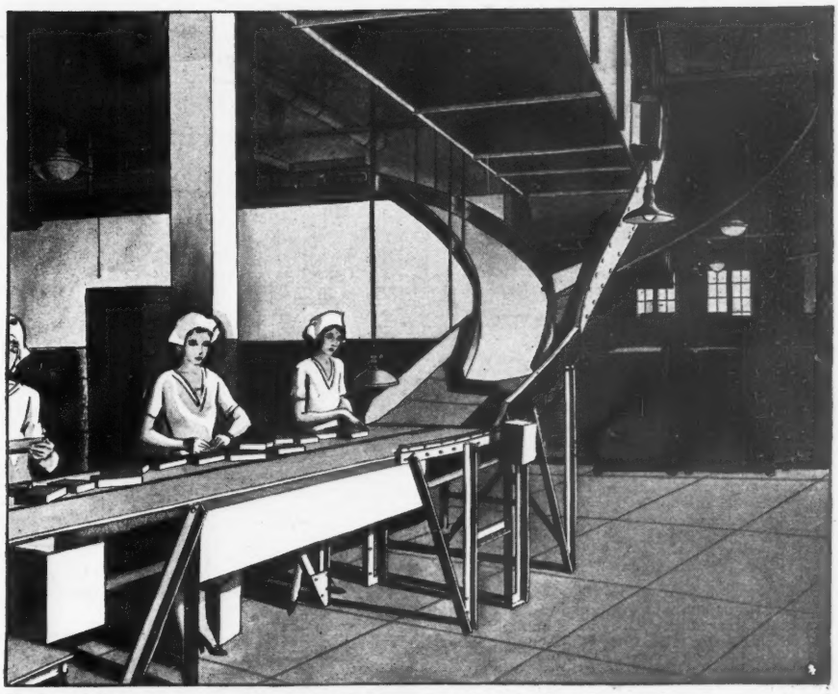
It is fully described (both types—angle and globe) in our illustrated printed matter which will be gladly sent. Write today for Bulletin XG 250.

FULTON SYLPHON Co.

KNOXVILLE, TENN., U.S.A.

Representatives in all Principal Cities in U. S. A.,—European Representatives, Crosby Valve and Eng. Co., Ltd., 41-2 Foley St., London, W. I., Eng.; Canadian Representatives, Darling Bros., Ltd., 140 Prince St., Montreal, Que., Canada.

DOWN COME THE DETOUR SIGNS



Mathews Belt Conveyers are used extensively in the modern Clark Brothers Chewing Gum Company plant at Pittsburgh. Mathews Sheet Metal Spiral Chutes form a connecting link between overhead and working level belt lines.

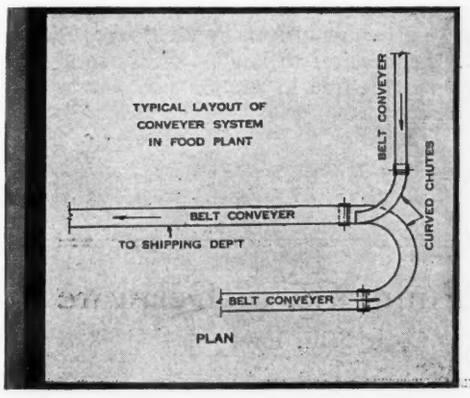
When business ripped along with both feet on the accelerator, roundabout handling methods were not so painfully prominent . . . perhaps because the jolts and bumps of excessive costs were cushioned by a set of good shock absorbers, big production and generous profits.

But today, the detour signs are coming down. Everywhere, executives have had more time to scan cost figures . . . to realize the extreme importance of a direct right-of-way over which production may travel rapidly, safely and at minimum cost . . . . and many of these men, planning for the future as well as for the present, have selected Mathews Conveyer Systems as their new production routes.

To those executives knowing revisions necessary and desiring concrete suggestions for the most efficient handling layouts possible . . . . to those dubious of existing methods and welcoming comparative data showing what could be expected if changes were made . . . Mathews offers the services of a competent staff of conveyer engineers.

Back of this staff is an amazingly complete group of conveyer units. There's the sturdy gravity roller, pioneered by Mathews long ago. There are belt, chain and trolley conveyers, created to meet the demand for regulated movement. There are these and a host of others, all with their definite purpose.

In your modernization plans, consider Mathews Conveyer Systems. An interesting conveyer book, sent to you on request, presents ideas on how to eliminate the detours.



MATHEWS
CONVEYER SYSTEMS

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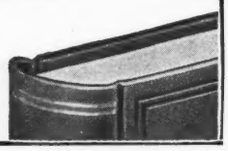
Birmingham . . . Boston . . . Buffalo . . . Charlotte . . . Chicago . . . Cleveland
Dallas . . . Denver . . . Detroit . . . Los Angeles . . . Milwaukee . . . Minneapolis
New Orleans . . . New York . . . Philadelphia . . . Pittsburgh . . . St. Louis . . . San Francisco . . . Seattle . . . Mathews Conveyer Company, Limited, Port Hope, Ontario

Just published

a comprehensive manual of chemical theory and its application to cookery processes



Chemistry and Cookery

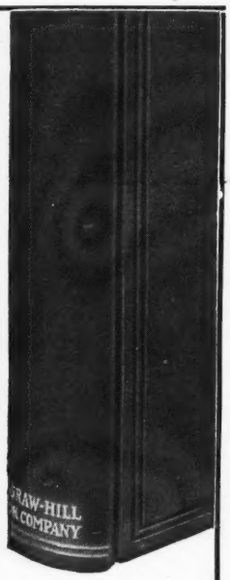
by ANNIE LOUISE MACLEOD

Dean of the College of Home Economics, Syracuse University; formerly Director of Euthenics and Professor of Chemistry, Vassar College

and EDITH H. NASON

Professor of Foods, Syracuse University; formerly Instructor in Chemistry, University of Illinois; formerly Assistant Professor of Home Economics, Cornell University.

THIS new book, prepared for the training of students in home economics, is in effect a very thorough manual of scientific cookery. It gives a clear and adequate treatment of chemical theory, developed from the electronic point of view, and many illustrations of the application of these principles to cookery problems. The material is understandably presented and comprises much valuable information for the research chemist, dietician, production man, promotion man and food company executive.



545 pages
5½ x 8
$3.50

Partial List of Contents

Electronic Nature of Matter. Nature of Chemical Reactions. Weight Relations in Chemical Reactions. Periodic Table. Oxygen and Hydrogen: Examples of Chemical Elements and of Synthetic Reactions. Nature of Gases, Liquids and Solids. Energy Transformations with Changes of State. Solutions. Base and Acid Forming Elements. Reversibility of Ionic Reactions. Hydrolysis of Salts. Acidimetry and Alkalimetry. Carbon Dioxide and Carbonic Acid. Carbonates and Baking Powders. Metals and Their Use in the Household: Displacement Reactions. Energy Changes in Chemical Reactions. Electrolysis. Solution Tension. Colloidal States. Carbon and Carbonaceous Fuels. Hydrocarbons. Alcohols. Aldehydes and Ketones. Acids. Esters. Oils and Fats. Soaps and Their Cleansing Properties. Carbohydrates. Flours and Other Grain Products. Proteins. Eggs and Egg Cookery. Meat and Meat Cookery. Cyclo Organic Compounds. Vegetable Cookery. Colors in Vegetables and Their Changes During Cookery Processes. Milk and Milk Products. Beverages. Food Preservation. Concerning Batters and Doughs. Laboratory Manual.

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The unrelenting, constant search for new ideas, that make for improvement and our rigid policy of adopting only those that are able to pass through the crucible of our exacting standards, is your surety that Shriver is the last word in filter presses. Only a Shriver Filter Press is worthy of its name. Your inquiries are solicited.

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Established 1860
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A Filter Press For Every Purpose

SHRIVER

Filter Presses Filter Cloth Diaphragm Pumps

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in Your '31 Plans

WHETHER you are planning the purchase of liquid pumping equipment for new plants or the modernizing of present ones—the Viking Sanitary Rotary is the Pump to buy. Simple in design . . . just two moving parts. Approved by all Boards of Health. Economical to buy . . . easy to install . . . trouble-free in service . . . and long in life.

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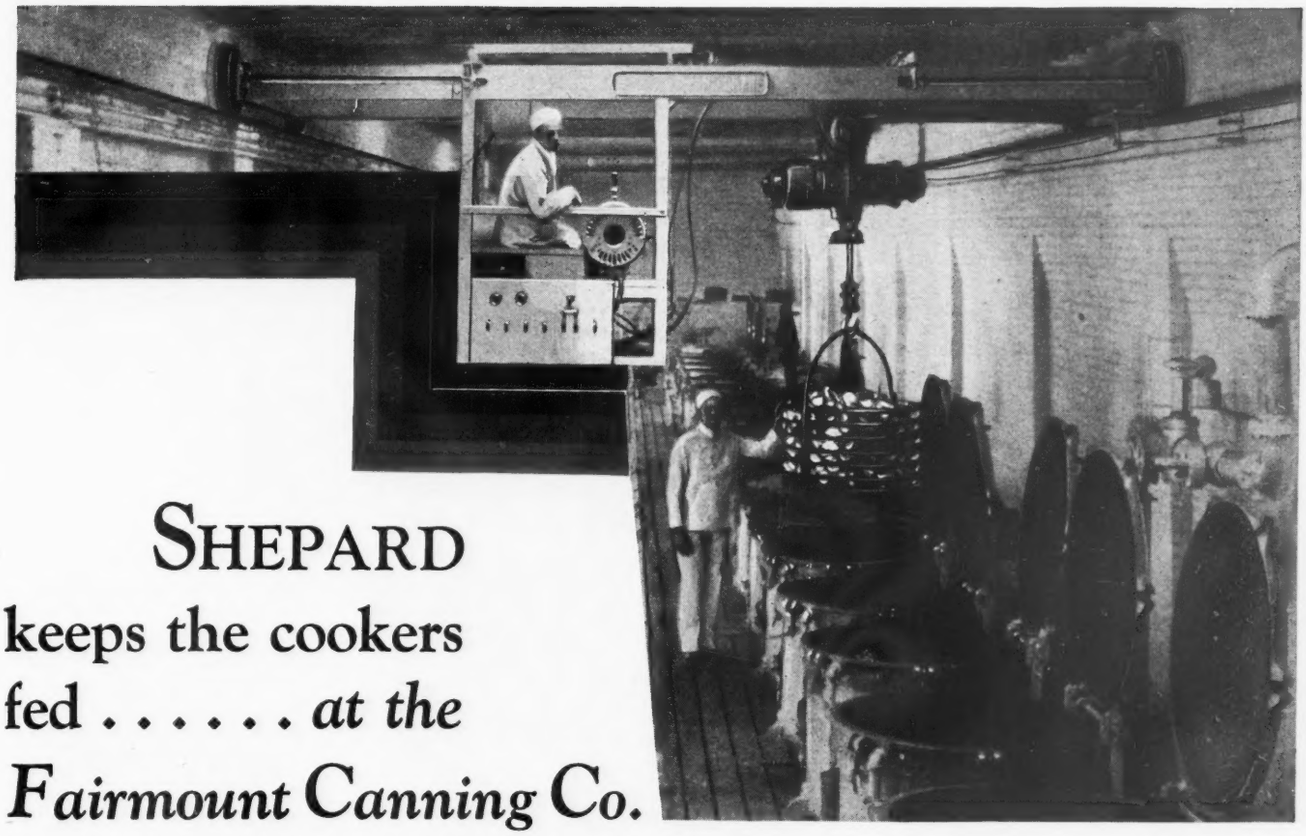
Viking Pump Co. of Delaware

Cedar Falls, Iowa



SHEPARD keeps the cookers fed . . . . . *at the Fairmount Canning Co.*

Feeding baskets of uncooked canned foods into the cookers . . . lifting them out when they're done . . . this is the service a 1-ton Shepard Single I-Beam Crane has been rendering for several years, without let-up or break-down, at the Fairmount Canning Co., Fairmount, Minn.

Long hours in the steam and heat have no effect on the Shepard enclosed unit construction. There's strength and stamina to spare and the Shepard Balanced drive, permanent alignment and automatic oil bath lubrication assure years of continuous service with a minimum of attention.

This crane is one of the comprehensive line with which Shepard meets the varied load-handling needs of the food industries. Whether your job demands a long lift, high speed, or close clearance, there is a Shepard crane or hoist that fills the bill exactly.

Shepard engineers are located in the principal cities from coast to coast . . . ready to show you what Shepard Planned Load-Handling will do for your business. Write to Montour Falls.

SHEPARD NILES CRANE & HOIST CORPORATION

Main Office: 422 Schuyler Ave., Montour Falls, N. Y.
Works: Montour Falls, N. Y., and Philadelphia, Pa.

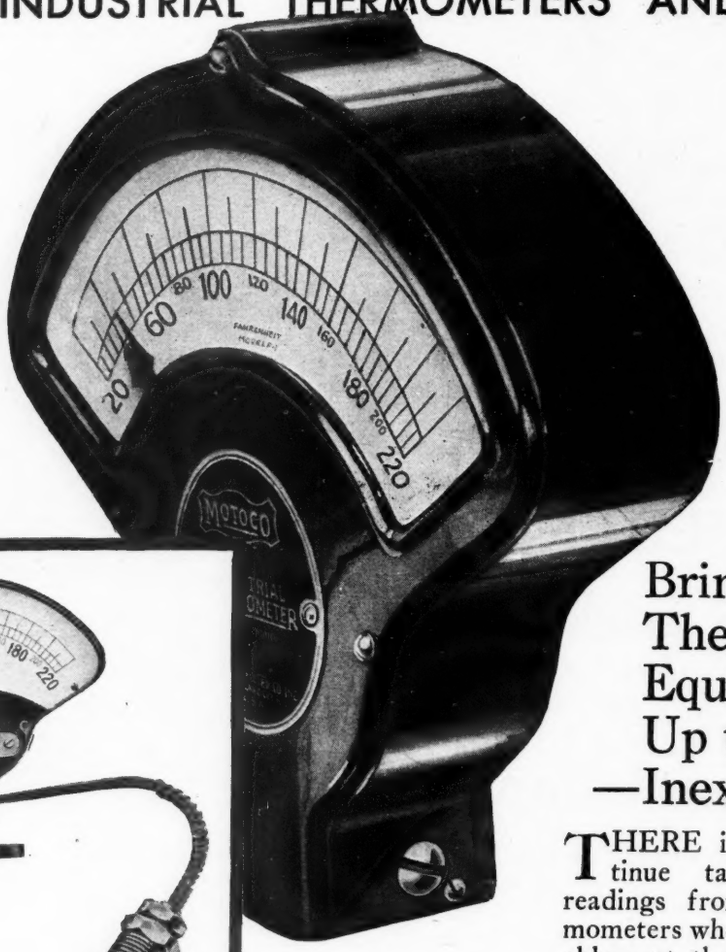
Shepard Niles builds

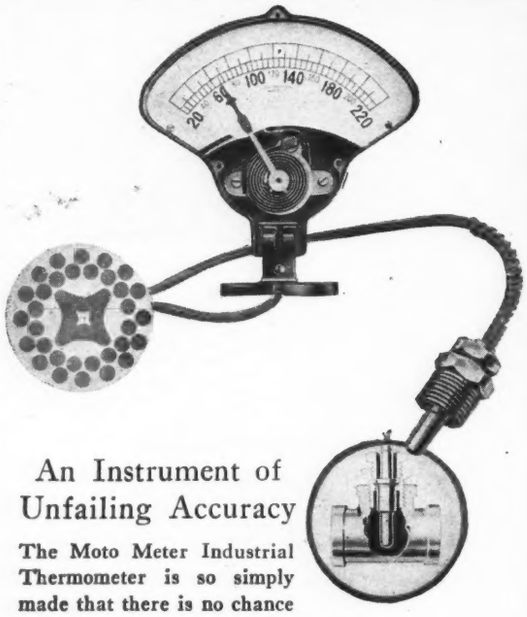
Traveling Cranes
(from 1 ton to 450 tons)
Transfer Cranes
I-Beam Cranes
Gantry Cranes
Wall Cranes
Jib Cranes
Bracket Cranes
Cage Operated Hoists
Floor Operated Hoists
Cupola Chargers
Shepard Track
& Switches
Winches

Member EMA

SHEPARD
CRANE & HOIST DIVISION

MOTO METER INDUSTRIAL THERMOMETERS AND GAUGES





An Instrument of Unfailing Accuracy

The Moto Meter Industrial Thermometer is so simply made that there is no chance for the inaccuracy that comes with more complicated mechanism—as will be seen from the cut-away section shown above the indicating mechanism consists of a Bourdon tube connected to an indicating hand. Where the distance tube is used the tube itself is protected from damage by its surrounding braiding of fine wire.

Bring Your Thermometer Equipment Up to Date —Inexpensively

THERE is no need to continue taking temperature readings from old style thermometers when at a very reasonable cost they can be replaced with the modern Moto Meter Industrial Thermometer with its large clear fan-shaped face easily read at a distance of twenty feet and capable of being located as far as fifty feet from the point at which the temperature is taken.

Moto Meter Industrial Thermometers can be adapted to any need by use of rigid stem, angle stem or distance tubing. They come in temperature ranges from minus 40° F. to plus 750° F. They can be equipped with electrical contacts to sound an alarm or start a motor by relay.

Moto Meter also manufacture a complete line of Vacuum and Pressure Gauges

Catalog FI-430 may be had on request. Mention type of thermometer or gauge in which you are interested.

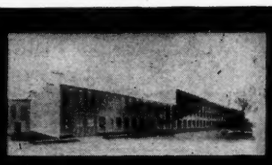
MOTO METER

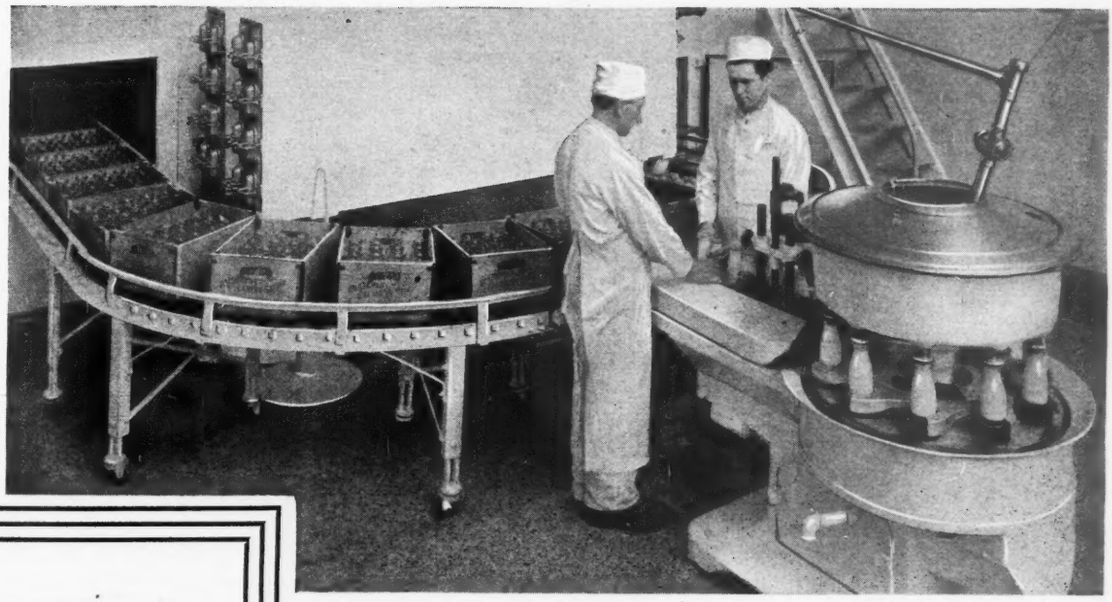
GAUGE & EQUIPMENT MOTOMETER CORPORATION

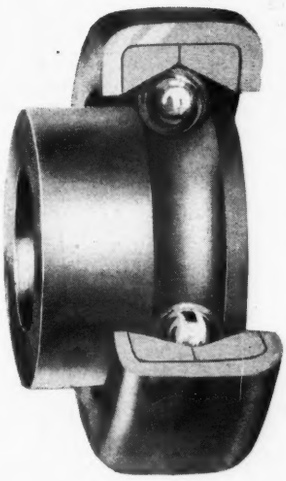
LONG ISLAND CITY, NEW YORK, U. S. A.

TOLEDO, OHIO LA CROSSE, WIS.

Factories at Long Island City . Toledo . La Crosse . Canada . England
France . Germany . Australia







Standard Gravity Rollers can be furnished with a grease sealed outer chamber for protection against corrosion or rust. The illustration shows the new, specially hardened three-part ball race. The balls being in contact with the race at three equidistant points, give even distribution of loads and consequent longer life.

Standard Conveyors

are designed to meet Modern Dairy Handling

Standard Conveyors, all types, have fully demonstrated their great value to the Dairy industry. Standard design is such that these conveyors play a large part in assuring sanitation. Standard construction is such that these conveyors speed up the daily output and prevent congestion about the receiving and shipping platforms, the filling and bottle washing machines, and in other departments. Standard economy is another important handling consideration. These conveyors stay in service and are dependable under most severe conditions. Various features of construction guard against breakdowns.

Our Conveyor Counselors will be glad to talk it over with you anytime—they may be of valuable aid to you in making your new production plans. Ask them about Standard Conveyors now in the service of Dairies.

STANDARD
CONVEYOR COMPANY
NORTH SAINT PAUL, MINNESOTA

ATLANTA, 712 Flatiron Bldg.
BALTIMORE, 15 W. Franklin St.
BEAUMONT, Post Office Box 402.
BIRMINGHAM, 1116 Martin Bldg.
BOSTON, 755 Boylston St.
BRIDGEPORT, 406 Court Exch. Bldg.
BUFFALO, 908 Ellicott Square
BUTTE, 51 E. Broadway
CHICAGO, 400 W. Madison St.
CINCINNATI, 1106 Ingalls Bldg.
CLEVELAND, 5005 Euclid Ave.
DENVER, 1420 Sixteenth St.
DETROIT, 420 U. S. Mortgage Bldg.
EVANSVILLE, 20 Furniture Bldg.
FORT WAYNE, 816 Kinnaird Ave.
ELIZABETH, 27 Hillside Rd.
GRAND RAPIDS, 533 Michigan Trust Building
HARRISBURG, Post Office Box 83.
JACKSONVILLE, 21 N. Ocean St.
KANSAS CITY, 1321 Union Ave.
LOUISVILLE, 504 Columbia Bldg.
MILWAUKEE, 594 E. Water St.
NASHVILLE, 178 Eighth Ave., North
NEW ORLEANS, 1003 Magazine St.
NEW YORK CITY, 461 Eighth Ave.
OMAHA, 1124 Harney St.
PEORIA, 1303 Peoria Life Bldg.
PHILADELPHIA, 1541 Spring Garden Building
PHOENIX, Post Office Box 145.
PORTLAND, 53 First Ave.
PITTSBURGH, 1517 Clark Bldg.
ST. LOUIS, 3104 Magnolia Ave.
SALT LAKE CITY, 204 Dooley Bldg.
SAN FRANCISCO, 4401 San Bruno Ave.
SEATTLE, 321 Lumber Exchange Bldg.
SYRACUSE, Van Vleck Road
TOLEDO, 228 17th St.

Spray Drying Plant of Otato Corporation, Burley, Idaho

Have you studied the sales building possibilities in . . .

SPRAY-DRYING

The following are a few of the products that are capable of spray-drying:—

Eggs
Potatoes
Yams
Strawberries
Pineapple Juice
Bananas
Molasses
Corn
Barley
Oats
Milk
Casein

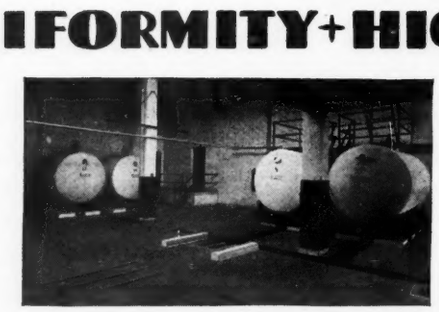
Spray-drying **is the art of reducing solids held in solution or suspension to a relatively dry powdered condition.**
To accomplish this result the solution, suspension, emulsion, or slurry is finely atomized in a gaseous heating medium such as air. The air transmits its heat to the individual particles of spray, and the moisture in the globule of spray is in turn evaporated. This leaves the solids behind as particles of powder floating in the air stream. The particles are then separated as a finished powdered product.

Spray-drying **is a general purpose process that is applicable in many lines of industry.**
It makes possible the salvaging of waste and the preservation of foods. It creates new products of high sales value.
It delivers a quality product of high uniformity. The Bowen Research Corporation is adequately equipped with its own commercial test plant. A highly trained personnel is available to handle every kind of spray-drying problem. Our experts all have years of experience behind them in the spray-drying art. You will find that they really *know*.

BOWEN RESEARCH CORPORATION
136 LIBERTY STREET, NEW YORK CITY

"U.S.Gel."

PURITY+UNIFORMITY+HIGH BEATING



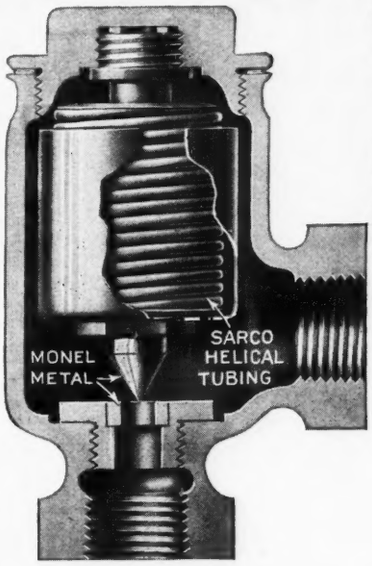
Candy makers everywhere use "U. S. Gel." with the confidence of knowing that their product is finer for having chosen so wisely. "U.S.Gel." is the finest protective colloid and emulsifying agent that can be made. It is uniform . . pure and has high beating properties . . It is particularly suited to the making of marshmallows and other foams. Produced in the most modern and completely equipped plant in the world . . . "U. S. Gel." sets the standard of purity. Perfect control . . . double filtration . . . glass lined pipes and storage tanks assure its superiority. Let "U. S. Gel." prove itself in your own plant. Testing samples will be sent on request. Use the coupon below for convenience.

UNITED STATES GELATINE CO., *Milwaukee, Wis.*
Branches: New York Chicago Cincinnati Grand Rapids

UNITED STATES GELATINE CO., Milwaukee, Wis.
Gentlemen: Please send us samples of "U. S. Gel." for testing purposes. It is to be used in connection with.....*(fill in type of product)*
Name of Company.....
Address.....City.....State.....

Conquering another Goliath!

Diminutive in size—but large in capacity—the Sarco Steam Trap is conquering millions of Goliath fuel wastes by keeping steam lines continuously drained of condensate.



Sarco Steam Trap operates by the expansion of a sensitive liquid contained in a Sarco helical bellows. There is no destructive wire drawing or steam loss at any time.

SARCO STEAM TRAP

does all that a big, clumsy and expensive trap of equal rating will do—but does it at an initial expense of only about one-third of the price asked for the latter. It requires no trench or platform support for installation. Just screw it into the pipe line, like an ordinary fitting.

Sent on 30 days' trial.
Use the coupon.

You can't be everywhere at the same time

But even if you could simultaneously adjust a dozen or more hand valves—it would still be impossible for you to obtain the same high degree of temperature regulation that is always present where Sarco Temperature Regulators are installed.

SARCO TEMPERATURE REGULATOR

is simple in design and requires no compressed air, water pressure or electricity for operation. Easily installed without additional pipe connections.

Sent on 30 days' trial. Use the coupon.

SARCO COMPANY, Inc.

183 Madison Ave., New York, N. Y.

Branches in all Principal Cities

Walker, Crosweller & Co., 20 Queen Elizabeth St., London S.E. 1

SARCO Co., Inc., 183 Madison Ave., New York, N. Y.
Without obligation on my part, please send, on 30 days' free trial, the following:
☐ Steam Trap, size.....for pressure.....lbs.
☐ Booklets AE-95 and AE-70.

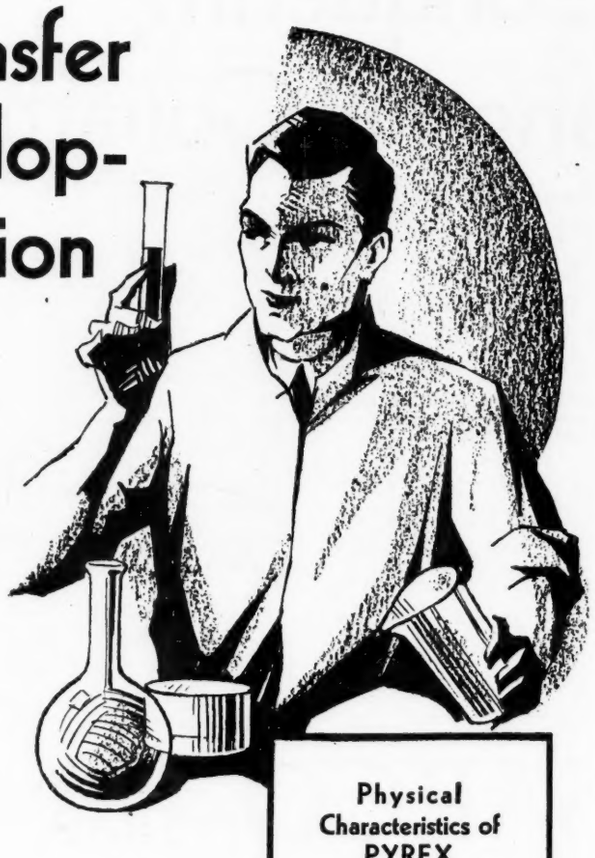
Name .....

Address .....

Town .....State .....

When You Transfer Laboratory Developments to Production

. . . You can transfer the Equipment, too.



TEST samples from the laboratory need not be so difficult to duplicate in commercial production as they ordinarily are. Eliminate contact with corrosive materials and you remove a considerable source of trouble.

And it can be done. Most PYREX laboratory ware, in which the greater part of laboratory work is done, has grown up to commercial equipment proportions. Take containers for an example—the PYREX flasks and beakers of the laboratory have become carboys, pots, and jars in production equipment. In batch operations especially they provide the highly desirable elimination of contamination from chemical erosion and corrosion. They introduce constant visual control of color and consistency, for PYREX industrial ware is more transparent than the best plate glass.

Physical Characteristics of PYREX Industrial Ware

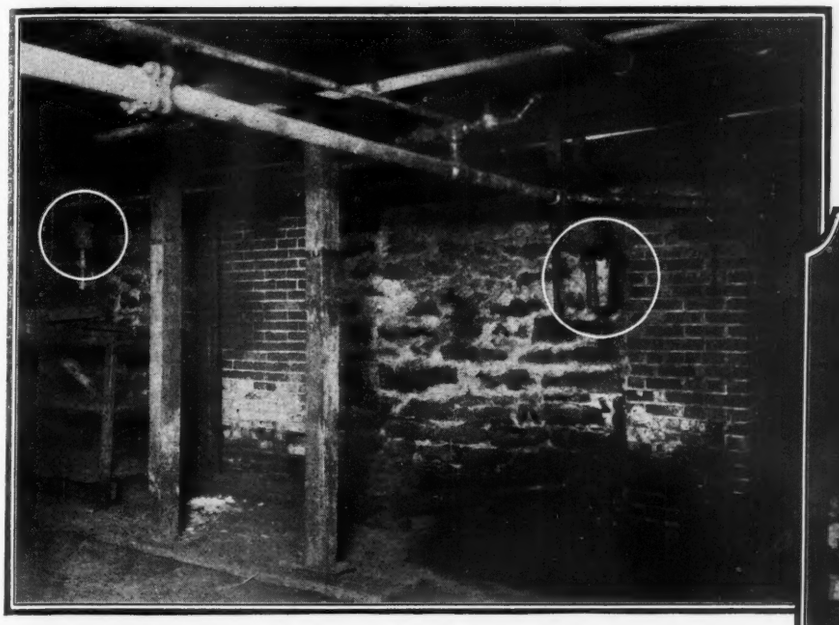
LINEAR COEFFICIENT OF EXPANSION—.0000032 or less between 19°—350° C.
ELASTICITY COEFFICIENT—6530 kg. per sq. mm.
HARDNESS—Scleroscope, 120.
SPECIFIC GRAVITY—2.25.
SPECIFIC HEAT—0.20.
REFRACTIVE INDEX—1.4754.
DISPERSION—0.00738.
LIGHT TRANSMISSION—Higher than the best plate glass.

Compare the characteristics of PYREX industrial ware with your requirements. Our engineers will gladly suggest means of introducing these characteristics into your equipment, without charge.

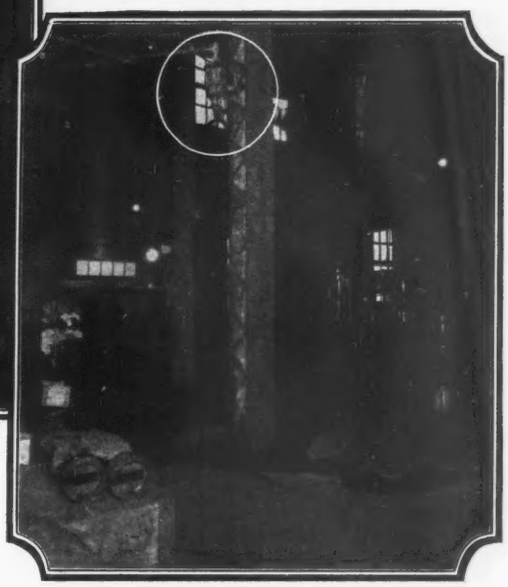
▪PYREX▪
INDUSTRIAL WARE
Industrial and Laboratory Division
CORNING GLASS WORKS
CORNING NEW YORK
New York Office, 501 Fifth Avenue

T. M. PYREX Reg. U. S. Pat. Off.

C-4



Armstrong traps in the plant of the Jacob Dold Packing Company, Buffalo, New York



—what Armstrong "non-airbinding" means in food products steam trapping—

ONE of the outstanding features of Armstrong inverted bucket traps that has helped place more of them in service than any other mechanically operated trap is the impossibility of air-binding. Unlike most traps, the inlet is at the bottom, the outlet at the top. Air and undissolved gases rise to the top of the trap and are discharged with the condensate, yet the trap is always water-sealed against steam leakage.

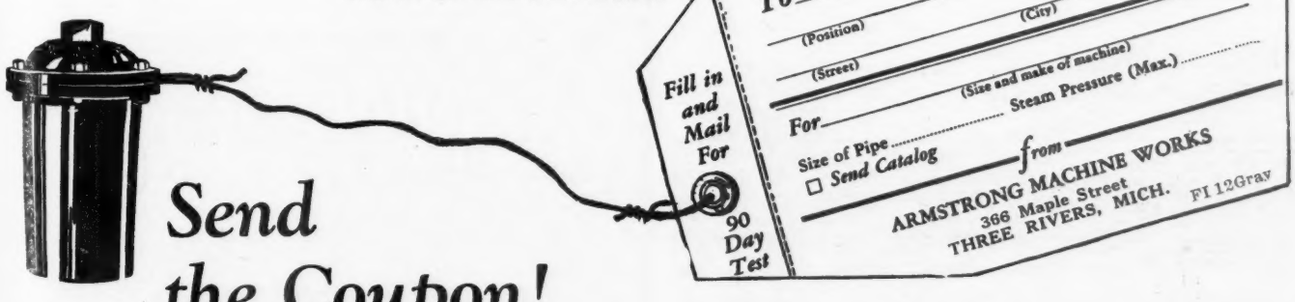
Since the Armstrong cannot airbind, the steam chambers of kettles, vacuum pans, etc., are not handicapped. Temperatures can be controlled as positively as steam pressures without costly regulating equipment. This is especially true where steam chambers are *individually* drained with Armstrong traps. The cost of the traps is returned many times in savings—as in the case of kettles used for rendering fat in a club, the time was reduced from 3 to 4 days to 14 hours.

Armstrongs are furnished in sizes and types for steam pressures to 1350 lbs. and any degree superheat; also for acid resisting and other services.

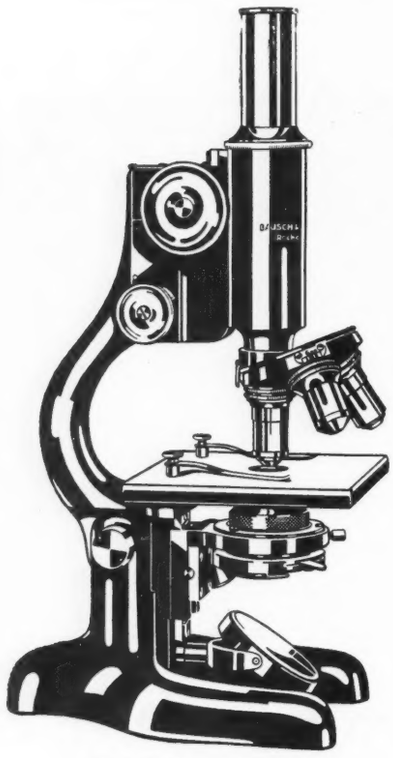
Let us furnish you with as many Armstrong traps as desired for 90 days' trial, without cost or obligation. Prove that they cannot airbind, are self-scrubbing, have large capacity with small size, do not wire-draw. The coupon is for your convenience.

ARMSTRONG · "INVERTED BUCKET" STEAM TRAP ·

ARMSTRONG MACHINE WORKS
366 Maple Street
Three Rivers, Michigan
District Representatives in 42 Cities



Send the Coupon!



B & L Microscope FFS

Stop Contamination BEFORE it Costs Money

A certain large dairy purchased a microscope for examining milk at the receiving platform. The instrument paid for itself almost at once by revealing a can of very contaminated milk, which, if it had been mixed with the pure milk, would have spoiled the entire batch. Then, too, it would have necessitated a holdup of many hours for complete sterilization of equipment.

The establishment of a laboratory for examination of raw materials susceptible to contamination will save many dollars each year in your business. Microscope FFS is a bacteriological microscope completely equipped for all laboratory work, and will give you complete satisfaction for many years.

BAUSCH & LOMB OPTICAL CO.
603 St. Paul Street Rochester, New York

BAUSCH & LOMB

Makers of Orthogon Eyeglass Lenses for Better Vision

PFIZER'S CITRIC ACID

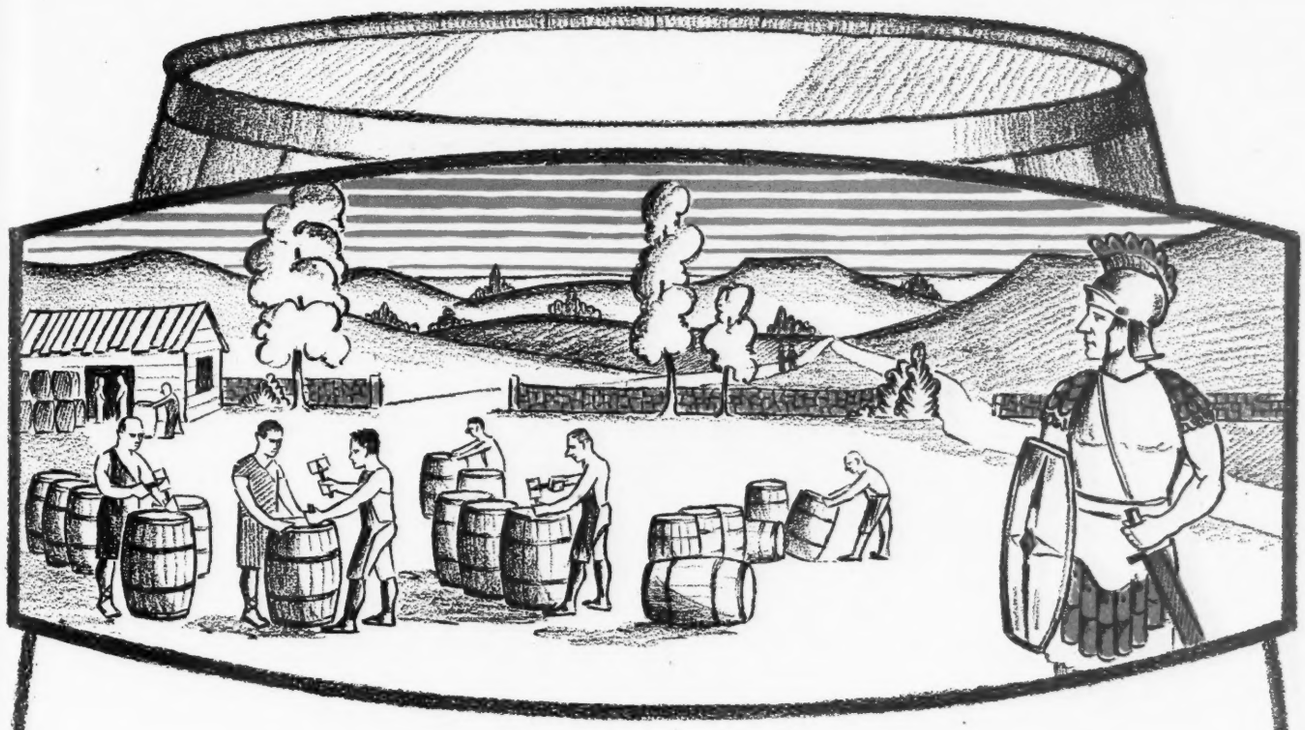
POWDERED
GRANULATED
CRYSTALS

SODIUM CITRATE

UNIFORM QUALITY
STRICTLY-U.S.P.

EIGHTY YEARS OF MANUFACTURING EXPERIENCE BEHIND OUR PRODUCTS

CHAS. PFIZER AND CO. INC.
MANUFACTURING CHEMISTS
81 Maiden Lane New York N.Y. Est. 1849 444 W. Grand Ave Chicago Ill.



Food Product Containers since the First Century: WOODEN BARRELS

The economy and efficiency of the WOODEN BARREL for the packing of food products was recognized even by the ancients. The historian, Pliny, refers to the use of the wooden barrel by the inhabitants of the Alpine Valley in the year 100 A.D. and attributes the invention of cooperage to these peoples.

The popularity of the WOODEN BARREL in this service has never waned. Today no other method of food product packing is so appreciated for its superior and desirable characteristics of strength and sanitary value.

In the protection of food products in handling and in transit, wooden barrels are still without a rival. Packed in clean WOODEN BARRELS, your food product reaches its destination safely, uncontaminated, unharmed by moisture, atmospheric changes, and protected against spoilage.

Hundreds of various food products, liquid, semi-liquid, dry and powdered, are now packed in tight or slack wooden barrels.

The Associated Cooperage Industries of America is prepared to give you data with reference to any packing problem, without obligation.

THE
ASSOCIATED COOPERAGE INDUSTRIES
OF AMERICA

Railway Exchange Bldg., St. Louis, Mo.

WOODEN BARRELS

FIGURE 106-A

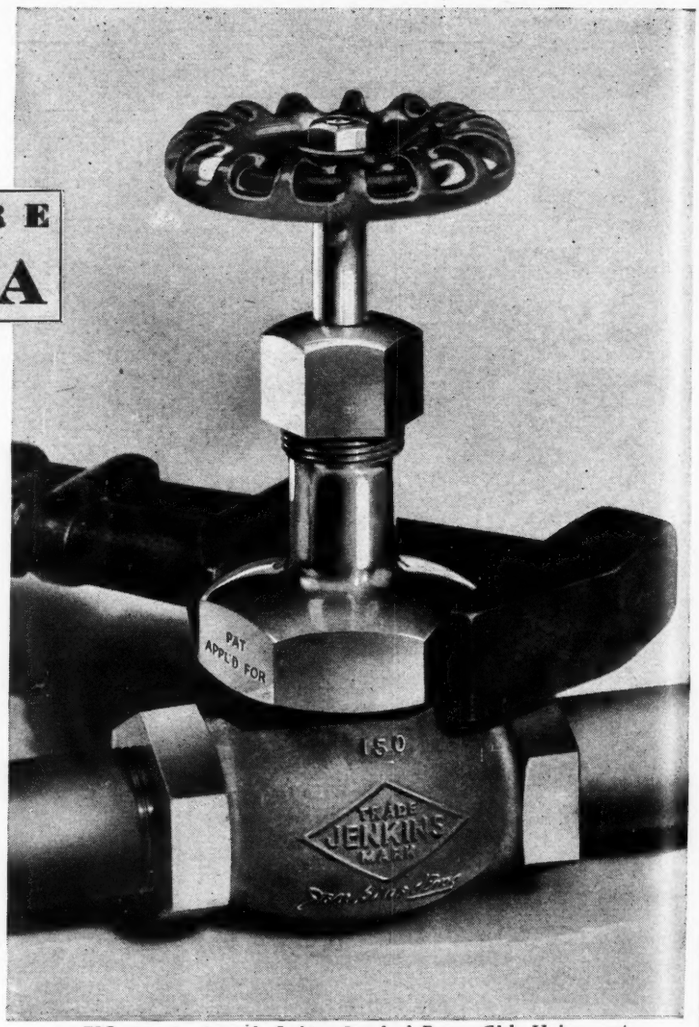


FIG. 106-A, *Screwed, Jenkins Standard Bronze Globe Valve, with one-piece screw-over bonnet and slip-on stay-on disc holder. For 150 lbs. steam working pressure, or 250 lbs. oil, water, gas working pressure.*

This one-piece screw-over bonnet won't distort . . .

Here is a valve that doesn't "fear" a wrench. It is a Fig. 106-A Jenkins Standard Bronze Globe with the one-piece screw-over bonnet.

This bonnet construction provides unusual strength to resist the strains of frequent removal. You can take the bonnet off and replace it repeatedly, and it won't distort. The large hex faces enable you to get a full purchase with a wrench.

Another advantage of Fig. 106-A is the slip-on stay-on disc holder . . . . a real innovation, possible only in this screw-over bonnet design. Ask your supply man to show you this Jenkins. Its superiority of construction and finish can be seen at a glance. It is made also in angle, cross and check types, screwed or flanged. Write for Bulletin 141 containing details.

JENKINS BROS.

80 White Street, New York, N. Y. — 524 Atlantic Avenue, Boston, Mass. — 133 No. Seventh Street, Philadelphia, Pa. — 646 Wash. Blvd., Chicago, Ill. — 1121 No. San Jacinto, Houston, Tex.
JENKINS BROS., Limited, Montreal, Canada; London, England
Factories: Bridgeport, Conn.; Elizabeth, N. J.; Montreal, Canada

Jenkins
VALVES
Since 1864

JENKINS VALVES ARE ALWAYS MARKED WITH THE "DIAMOND"

Safeguard the quality of your food products with ENDURO equipment

ENDURO

NIROSTA KA2

THE PERFECTED STAINLESS STEEL

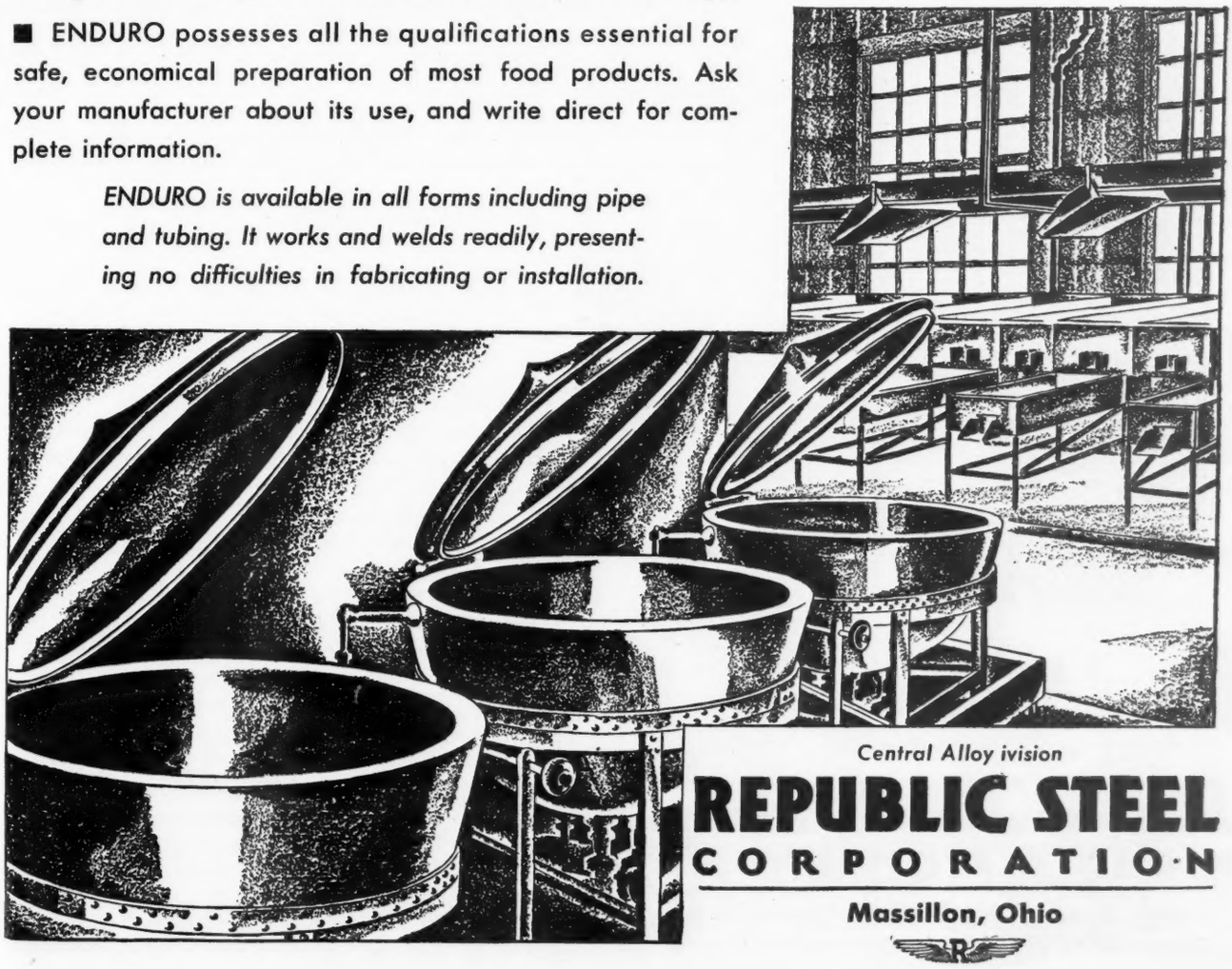
IN food plants producing quality products, contamination and tainting are problems of the past. The purity and flavor of these products are now safeguarded by using equipment of the perfected non-corrosive steel, ENDURO NIROSTA KA2.

■ PERMANENT protection is afforded by this improved metal, because ENDURO not only resists corrosion and discoloration on its mirror-like surface, but all the way through. It has no surface plating to chip or wear away. It is far stronger than steel and will withstand a lifetime of severe usage.

■ ENDURO possesses all the qualifications essential for safe, economical preparation of most food products. Ask your manufacturer about its use, and write direct for complete information.

ENDURO is available in all forms including pipe and tubing. It works and welds readily, presenting no difficulties in fabricating or installation.

ENDURO

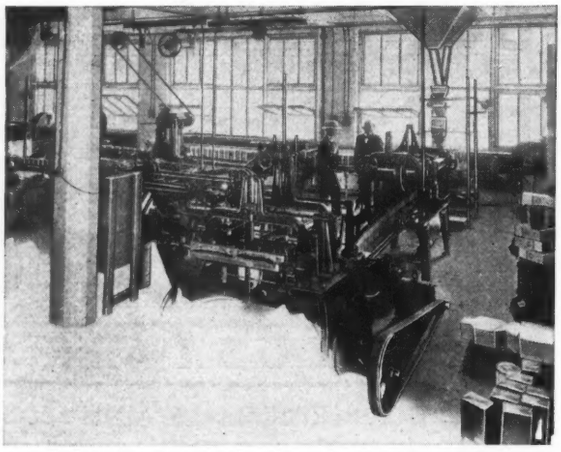


Central Alloy ivision

REPUBLIC STEEL

CORPORATION

Massillon, Ohio



PACKOMATIC Machinery turning out 30 packages per minute for Young and Griffin Coffee Company, Brooklyn, New York. "Very little service has been required in the two years these machines have been in our plant." * * * H. M. Mooney, Supt.

AUTOMATIC PACKAGING MACHINERY PAYS FOR ITSELF IN 26 MONTHS

The Young and Griffin Coffee Company, Brooklyn, New York, installed a complete PACKOMATIC packaging unit—

PACKOMATIC Lining Machine
PACKOMATIC Scott Scale and Transfer
PACKOMATIC Top Sealer
PACKOMATIC Wax Wrapper

Saving the labor of 10 people, or approximately $150.00 per week. This saving pays for the equipment in 26 months.

PACKOMATIC Packaging Machines are being used by hundreds of leading manufacturers because of their sturdy construction, efficiency, and high speed; and because of their adaptability to meet the requirements of every type of package.

A PACKOMATIC engineer is ready to consult with you about your packaging problems without obligation.

Write for Particulars

PACKOMATIC
FERGUSON PACKAGING NATIONAL MACHINERY

Write for Catalog

J. L. FERGUSON COMPANY, JOLIET, ILL.
BRANCH OFFICES: NEW YORK CITY ST. LOUIS LOS ANGELES

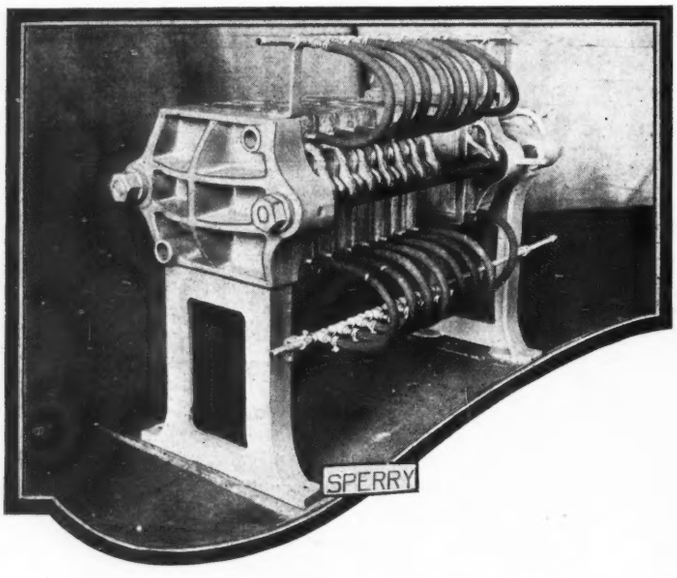


Plate type presses can be used with precise temperature control

Tin dipped plates *with steam connections*

The above press was designed for beeswax filtration but its applications are numerous.

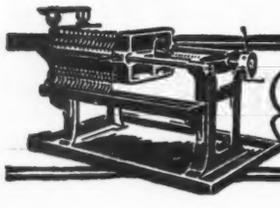
Steam circulation in the hollow plates provides proper temperature for filtration of the wax or similar material.

Both plates and frames are fully tinned as well as all channels and outlets in the press to prevent contamination or discoloration from the iron.

Other materials such as bakelite and enamel have been used successfully as plate coatings. Where possible this construction is less expensive than solid rubber, bronze, or wood plates, though any material you require can be supplied.

We will gladly send you a booklet illustrating many other types and variations of presses we have designed. They may suggest the press for your need.

D. R. SPERRY & CO., BATAVIA, ILL.



SPERRY FILTER PRESSES

H. E. JACOBY, 95 Liberty Street New York
B. M. PILHASHY, Merchants Exchange Bldg. San Francisco

PUT YOUR PROBLEM UP TO SHARPLES

IF IT'S CLARIFYING

- ☐ Oils
- ☐ Extracts
- ☐ Bouillons
- ☐ Syrups
- ☐ Fruit Juices—Etc.

IF IT'S DEHYDRATING

- ☐ Essential Oils
- ☐ Edible Oils—Etc.

IF IT'S RECOVERING

- ☐ Liquids from other liquids
- ☐ Solids from suspension
- ☐ Liquids from emulsions
- ☐ Waste products, etc.

Sharples performs a service to the process industries that is unique because it is different—and different because there is only one SUPER centrifugal force.

The same technical brains that developed the famous Sharples Dewaxing Process for Oil Refineries, the Sharples Process for the Dehydration of Water Gas Tar, the Sharples Process for Acidophilus Bacilli, and over 200 other commercial processes, are available for consultation on your difficult problems.

Put your problem up to Sharples engineers first, for Sharples has made its reputation by succeeding where others have failed.

THE SHARPLES SPECIALTY COMPANY, 2315 WESTMORELAND STREET, PHILADELPHIA. Boston, New York, Pittsburgh, Chicago, Detroit, Tulsa, San Francisco, Los Angeles, Toronto. Factories in England and France.

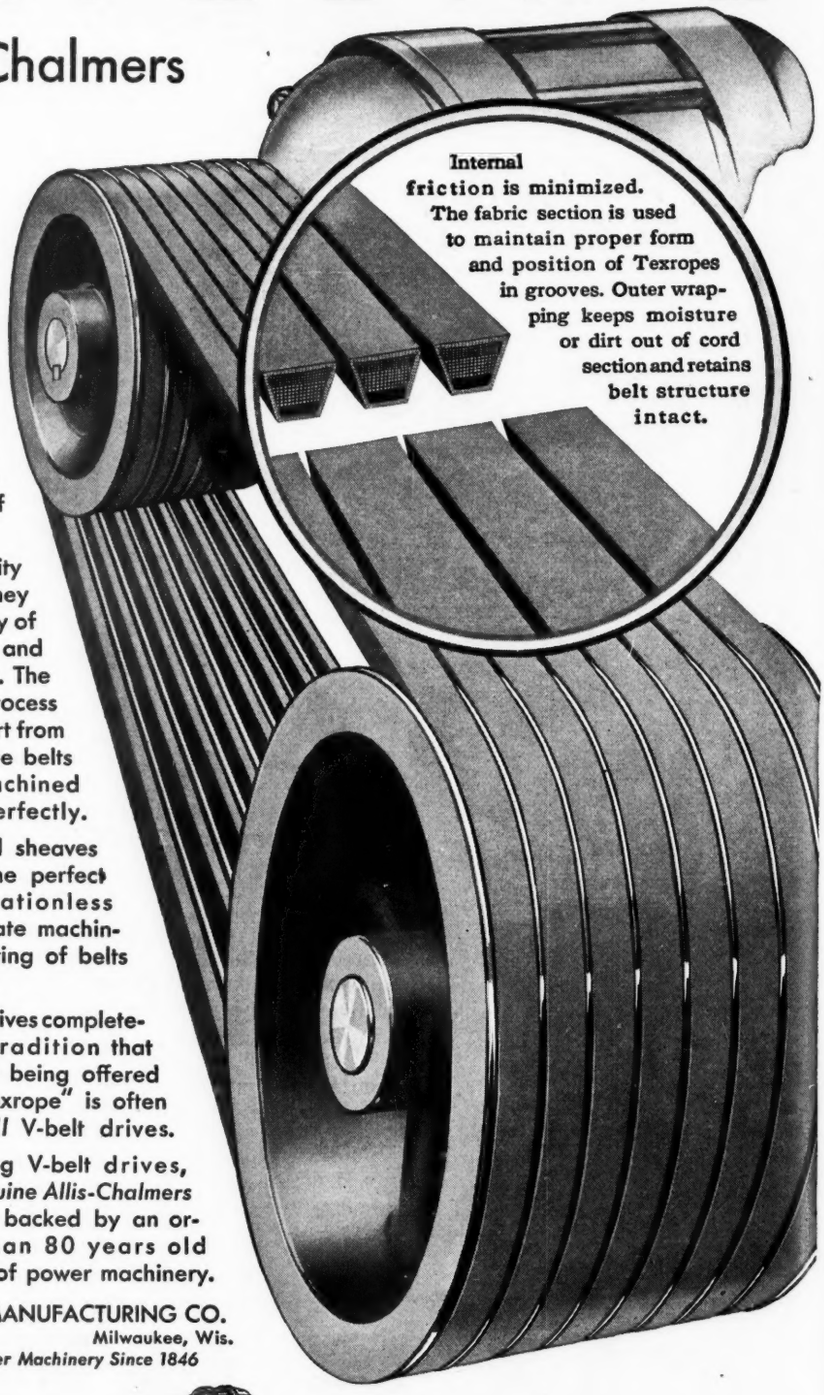
SHARPLES

CENTRIFUGAL ENGINEERS • • PHILADELPHIA

....There is only ONE TEXROPE DRIVE

It is made by Allis-Chalmers

and its use assures perfect performance!


Internal friction is minimized. The fabric section is used to maintain proper form and position of Texropes in grooves. Outer wrapping keeps moisture or dirt out of cord section and retains belt structure intact.

SO attractive are the savings effected with Texrope Drives that over 80,000 have been sold. Wherever correctly applied they have never failed to give complete satisfaction.

In originating and developing this drive that has revolutionized transmission methods, Allis-Chalmers has achieved the perfection that comes only after years of practical experience.

Texrope Belts possess amazing flexibility and long life. The process by which they are made is the result of every facility of The B. F. Goodrich Rubber Company and the vast Allis-Chalmers organization. The belt cores are built by a special process . . . the outer wrapper prevents dirt from working into the cord section. The belts are formed in accurately machined molds. They always seat perfectly.

In the manufacture of grooved sheaves Allis-Chalmers has secured the perfect balance so necessary to vibrationless operation . . . and the accurate machining that assures perfect seating of belts and unusually long service.

So rapidly have Texrope Drives completely smashed transmission tradition that many imitations are now being offered . . . and the word "Texrope" is often used in referring to *all* V-belt drives.

When you are buying V-belt drives, be *sure* to get the *genuine Allis-Chalmers Texrope Drives* . . . backed by an organization more than 80 years old in the manufacture of power machinery.

The Whole Story in 8 Minutes

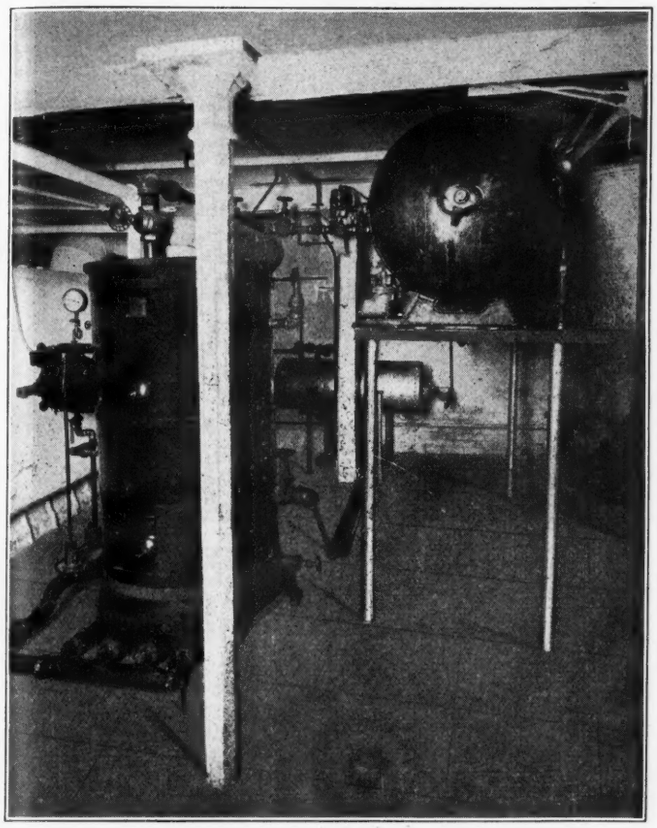
In 8 minutes you can get the whole story of Texrope Drives from this illustrated book. *Ask for a copy of Bulletin 1228.*

ALLIS-CHALMERS MANUFACTURING CO.
Texrope Division Milwaukee, Wis.
Specialists in Power Machinery Since 1846

ORIGINATED BY ALLIS-CHALMERS

TEXROPE DRIVES

THE DRIVES THAT REVOLUTIONIZED TRANSMISSION PRACTICE • • •



...Judge KANE Boilers *by* Your *Steam Needs!*

Peak Load now. By-product steam is apt to fluctuate, or at best, to require careful watching and control. Steam processes may easily suffer in one way or another— ***and you can't afford to let them!***

You need clean steam in abundance at definite pressures and temperatures for Jacketed Kettles, Steam Cookers, Sealing Chambers, Steam Tables, Still-retorts, and in the treatment of certain foods by live steam . . . ***Judge the KANE BOILER by your steam needs—***

KANE

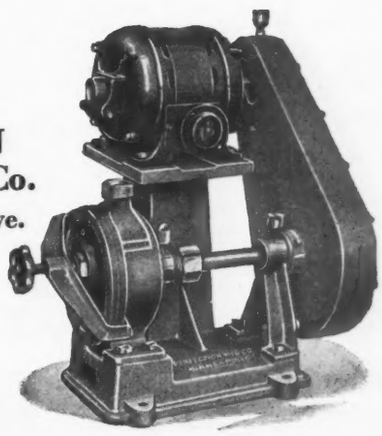
KANE BOILERS are gas-fired, automatic, compact. They eliminate labor of firing, ash disposal, steam uncertainties, and delays. They are economical, burning gas only in proportion to the steam withdrawn. Built in 17 different sizes to supply you with the boiler you need for an especial process. ***Write*** **our nearest branch office for Bulletins.**

MEARS-KANE-OFELDT INC.

1903-1915 EAST HAGERT ST. PHILADELPHIA

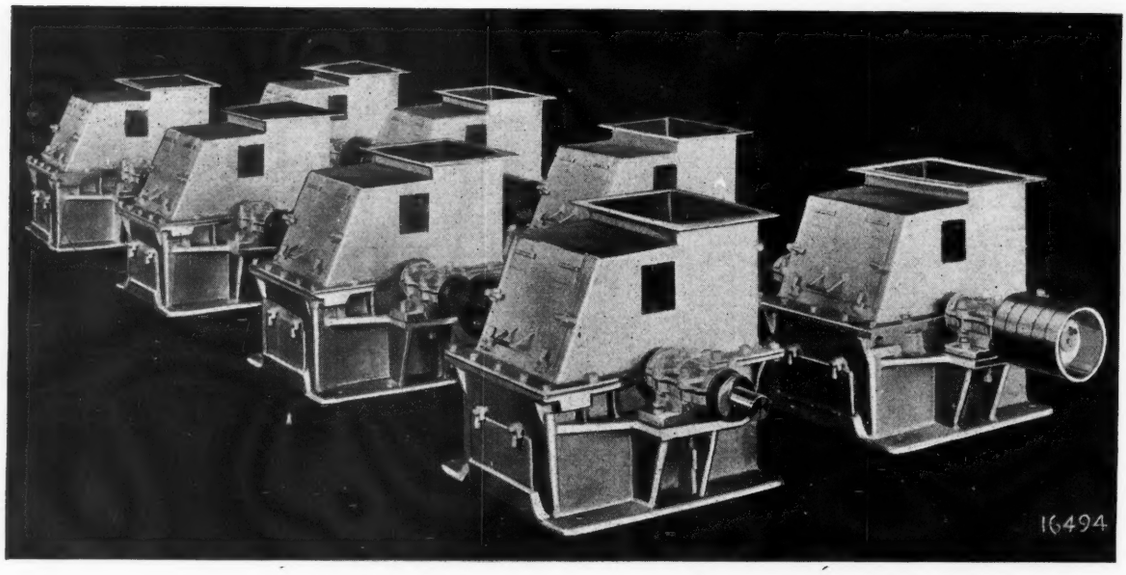
Chicago : : ***363 W. Erie St.***	**New York : :** ***9 Park Place***	**St. Louis : :** ***2010 Locust Blvd.***
Boston : : ***100 Arlington St.***	**Birmingham : :** ***Am. Trust Bldg.***	**Buffalo : :** ***Walbridge Bldg.***

A pump for the food industries — positive displacement— no valve mechanism—only two moving parts, which are the helical gear rotor and idler. It's the PERFECTION Pump!



PERFECTION Manufacturing Co.
2186 E. Hennepin Ave.
Minneapolis
Minn.

PERFECTION ROTARY PUMPS



TOMATOES
and Other Food Products

Tomatoes for soup is the reducing job for which this battery of Jeffrey Mills was specially built. They would be equally adaptable to the making of canned tomato pulp, tomato juice, catsup, etc.

Jeffrey builds a full line of Swing Hammer Shredders and Pulverizers; Flextooth Jaw and Roll Crushers, and gut hashers. In this line you will find a machine that may be adapted to do your reducing job with speed, economy and thoroughness.

Thirty-two different materials listed herewith used or produced in the food industries are now being handled in Jeffrey Machines. They range from smear lump in soft sugar through to such difficult materials as bone, skulls, and cocoanut shells.

Whatever your reduction job, see Jeffrey about it—it will mean economy.

Jeffrey Shredders and Pulverizers Economically Reduce a Wide Variety of Food Products

Algaroba Beans	Horns
Apples—for cider and vinegar	Kelp
Bone	Linseed Cake
Bread—stale	Lemon Peel
Cabbage for brant juice	Meat Cake
Castor Beans	Meat Scrap
Cocoa Beans	Orange Peel
Cocoa Hulls	Oyster Shells
Cocoanut Shells	Sugar
Cottonseed Cake	Sugar Cane
Cracklings	Salt
Egg Shells	Skulls
Gelatin—Dry	Tankage
Ginger Root	Tomatoes
Hoofs	Vanilla Beans
	Watermelons—for vinegar

The Jeffrey Manufacturing Company
927-99 North Fourth Street, Columbus, Ohio

New York	Rochester, N. Y.	Scranton, Pa.	Cincinnati	Chicago	St. Louis	Salt Lake City
Buffalo	Philadelphia	Boston	Cleveland	Charleston, W. Va.	Denver	Birmingham
Utica	Pittsburgh		Detroit	Milwaukee		Houston

Jeffrey Manufacturing Co., Ltd., of Canada: Head Office & Works, Montreal; Branch Office: Toronto.

JEFFREY PRODUCTS

Chains and Attachments
Sprocket Wheels—Gears
Elevators—Conveyors
Trolley Conveyors
Portable Loaders
Coal and Ashes Handling Equipment
Crushers—Pulverizers
Sand & Gravel Handling, Washing and Screening Equipment
Locomotives

JEFFREY
MATERIAL HANDLING EQUIPMENT

Cut Your Power Costs Save Your Grinders Avoid Fires Please Your Customers *with*

this NEW Dings Magnetic Separator

FULLY AUTOMATIC

THIS new separator designed and built by the world's largest manufacturer of magnetic separators is made especially for the feed grinder and grain man. A genuine Dings Separator.

It is so inexpensive it will pay for itself in a few months' time. It is a thousand times stronger than a permanent magnet. It is absolutely foolproof and completely automatic. You can install it yourself.

Ask any plant that ever used a genuine Dings Separator.

Write Today for Complete Information

Dings Magnetic Separator Co.
703 Smith Street
MILWAUKEE, WISCONSIN
Established in 1899
World's largest manufacturers of Magnetic Separators

Boston: 304 Rice Bldg.	San Francisco: 273 Seventh Street
New York City: 50 Church Street	Chicago: 332 S. LaSalle Street

Branch Offices in Other Principal Cities

Dings Magnetic Separator Co.,
703 Smith Street,
Milwaukee, Wisconsin

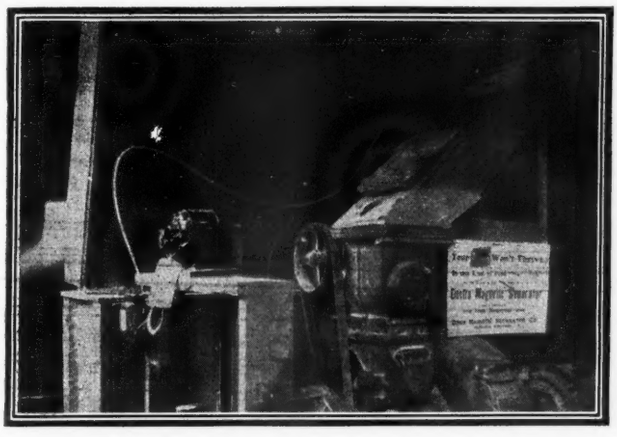
Gentlemen:

Please send me full details on your automatic separator for feed mills.

Name.....

Address.....

City..... State.....



Gentlemen:

Considering the present protection I have ahead of my attrition mill, which consists of a screen and several horseshoe magnets, there was some question in my mind as to whether your electro-magnet could do for me what you claimed it would, I am pleased at this time to say that it has proven to do all that you say it will.

Because of the large collection of nails, screws, nuts, staples, pieces of steel and cast iron, which got by our present means of protection and was caught by your high powered electro-magnet, I am pleased to recommend same to anyone operating an attrition mill. I am sure they will readily accept this information.

Your magnet has effected a savings in burns, as well as in power cost for grinding, by keeping the burrs in much better shape. It has been a source for more satisfied customers, as the farmers are well aware of the fact that many cattle die each year from iron in their ground feed.

But with this electro-magnetic protection, they are sure that the feed is free from the dangerous iron.

I feel that the price paid for one of these electro-magnets is a very good investment.

Yours very truly,

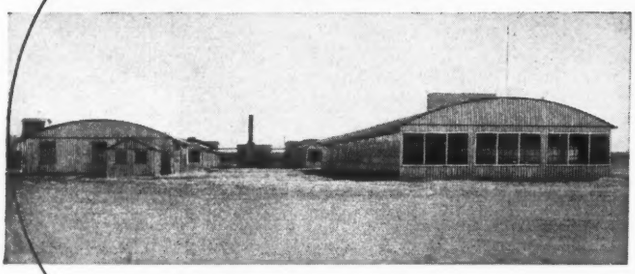
P. S. Solomon, Monroe, Wis.
(Henry Solomon Coal & Iron Co.)

Dings *High Intensity* **MAGNETIC SEPARATION**

FI12-Gray

MADE ENTIRELY OF STEEL

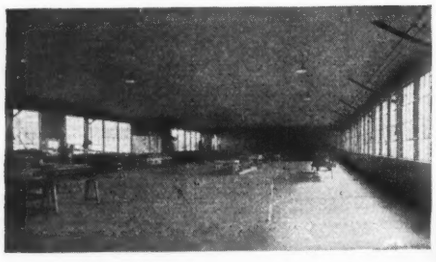
BUTLER



READY-MADE
STEEL
BUILDINGS

Economical Shelter
for Plants Processing or Packing Foods
at Points of Food Production

TAKING the factory to the raw product is a growing trend. Particularly so in the food processing industry where the raw product often perishes quickly. Economies in transportation, in labor, in overhead costs and in plant investment are also contributing factors responsible for this decentralization.



Interior view of plant above showing commercial wall board insulation. Plaster on steel lath may also be employed.

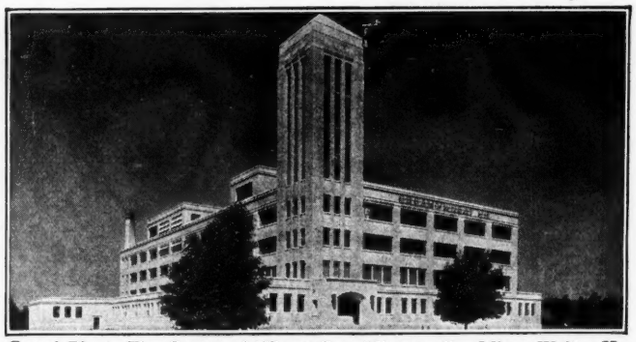
In Butler Ready-made Steel Buildings engineers are finding the solution to the problem of sheltering such outpost operations. They completely meet all requirements—Economy of Acquiring—Economy of Installation—Economy of Maintenance — Complete Materials — Speedy and Simplified Erection—Fire Safeness to offset lack of fire protection —and Structural Qualities which make for permanence, yet which permit enlarging, taking down and re-erection.

A new booklet picturing installations of many types of Butler ready-made Steel Buildings awaits your request.

BUTLER MANUFACTURING COMPANY

1249 Eastern Avenue
Kansas City, Mo.

949 Sixth Avenue, S. E.
Minneapolis, Minn.



Cereal Plant, The Cream of Wheat Co., Minneapolis, Minn. Walter H. Wheeler, Architect and Engineer, and C. F. Haglin & Sons Co., Contractors, Minneapolis.

Efficient . . . Economical

SCREEN PROTECTION

DO you know that more and more food producing plants where compliance with State or Municipal Pure Food Laws is necessary . . . as well as factories where efficient and economical screen protection for delicate products or sensitive equipment is required . . . are turning to Bayley Pivoted Windows Screened?

They afford an abundance of light and air . . . and thus help to protect the health of workers . . . speed up production . . . keep down overhead . . . reduce insurance hazards . . .

They differ from all other screened pivoted windows, in that ventilators operate without any movement of screens or flexing of screen contacts. Screens are easily removable, without use of tools, for cleaning or winter storage. Sections 1½″ deep add rigidity and strength. Large production reduces first cost . . . better design of sections reduces maintenance expense.

A feature of Bayley service is the helpful engineering cooperation, based on 49 years' experience, rendered on window problems. This assures complete satisfaction on every job. List of installations in any industry sent on request, also illustrated folders. . . . The William Bayley Company, 146 North St., Springfield, Ohio.

BAYLEY
STEEL WINDOWS & DOORS

District Offices

New York, 67 W. 44th St.
Boston, 5 Park St.
Chicago, 75 E. Wacker Drive
Cleveland, 449 Terminal Tower
Washington, 1427 I St., N. W.
Atlanta, 407 Bona Allen Bldg.
Springfield, O., North St.

Sales Agencies also in Principal Cities

Nunnally's

THE CANDY OF THE SOUTH

use it

for plant . . offices and stores

Not only in the plant, but in offices and stores as well, Nunnally's use Barreled Sunlight for interiors, lastingly clean and white.

SAMPLE Nunnally's, the candy of the South. Bite into these delicious confections. You'll know, without further question, that Nunnally's is a model plant . . . bright, cheerful, always immaculately clean.

Like so many leading food producers, Nunnally's prefer Barreled Sunlight for interior painting.

The long-lasting whiteness and cleanliness of Barreled Sunlight, its ready washability, its light-reflecting qualities are described at length in a new booklet, "Barreled Sunlight for Food Plants." Mail the coupon for your copy.

U. S. Gutta Percha Paint Co., Providence, R. I. Branches or distributors in all principal cities. (For the Pacific Coast, W. P. Fuller & Co.)

Nunnally's
THE CANDY OF THE SOUTH

ATLANTA
WASHINGTON
NORFOLK
SAVANNAH

JACKSONVILLE
BIRMINGHAM
RICHMOND
MIAMI

ATLANTA, GA.

December 20, 1929.

Nunnally's say . .

"We experimented with many different paints, finally choosing Barreled Sunlight.

"The selection was indeed an excellent one. Today, practically our entire plant, offices and stores are painted with Barreled Sunlight."

The assignment was a fairly hard
many different paints,

U. S. GUTTA PERCHA PAINT CO., 37-L
Providence, R. I.

Gentlemen: Send us a copy of the new booklet, "Barreled Sunlight for Food Plants."

Name_____

Address_____

City_____ State_____

Barreled Sunlight

Reg. U. S. Pat. Off.

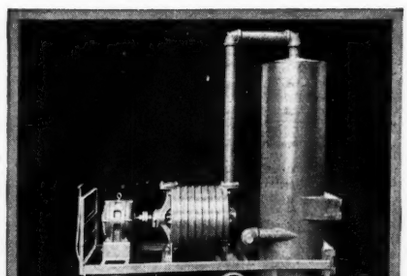
THE RICE PROCESS WHITE

"What a savings account this thing opened up!"

"SEEMS as though every time this vac makes a deposit in the dust-collector, it makes a deposit in the bank for the boss! You wouldn't believe it could save so much . . . in so many different ways."

In industrial plants and public utilities throughout the country, there are Sturtevant Vacuum Cleaners with substantial savings accounts to their credits. One man with a Sturtevant vac often does the work of a gang with brooms . . . more quickly and more thoroughly. Cleaning costs are usually cut 20 to 40% in time and labor alone . . . and there are other things to consider. Valuable wastes can be reclaimed . . . inflammable dusts stowed safely away. Fire hazard is lessened. Depreciation of plant equipment is slowed down. Efficiency steps up . . . both men and machines thrive on clean, dust-free air.

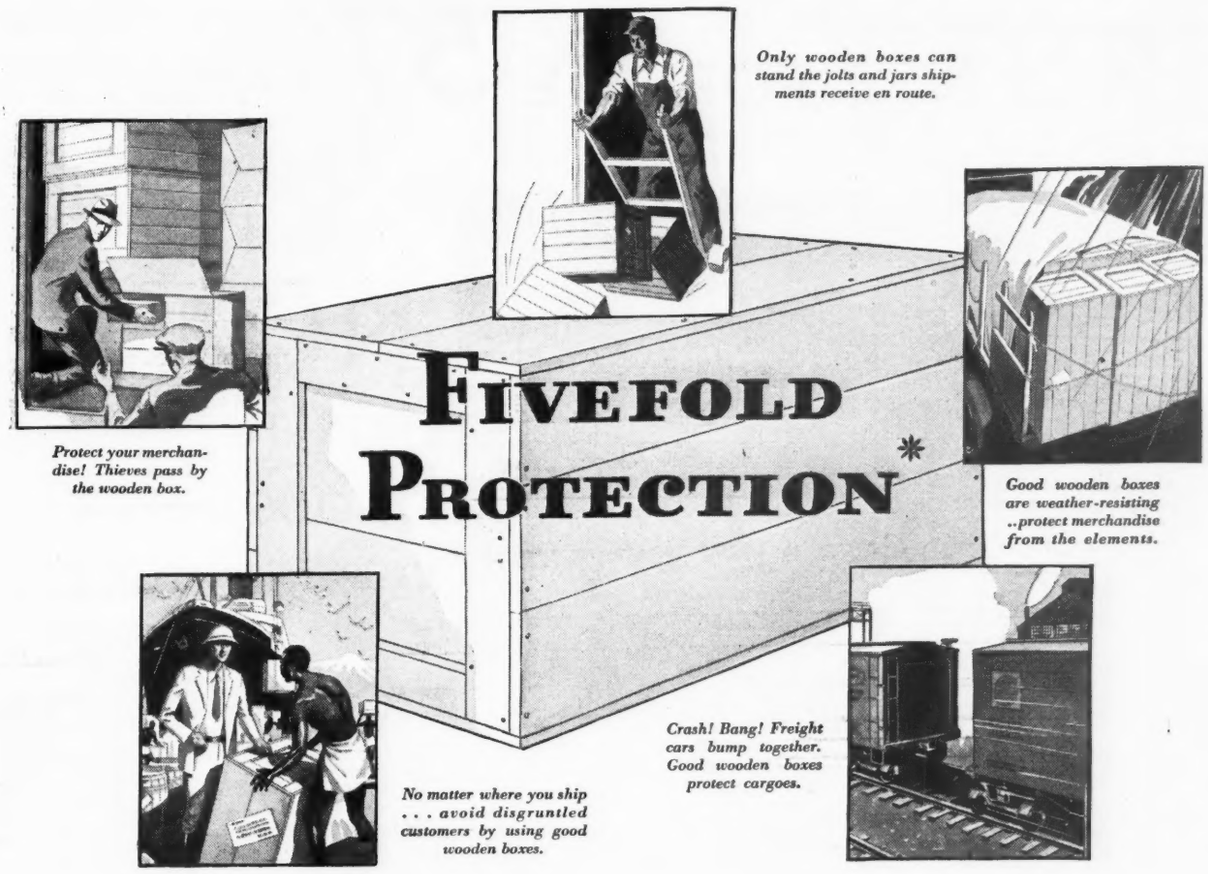
Find out how much of a savings account Sturtevant Vacuum Cleaners can open up for you. Our nearest office is at your service.



B. F. STURTEVANT COMPANY
Main Offices: HYDE PARK, BOSTON, MASS. ▪ CHICAGO, ILL., 410 No. Michigan Ave., ▪ SAN FRANCISCO, CAL., 681 Market St.

Branch Offices in Principal Cities. Canadian Offices at: Toronto, Montreal and Galt. Canadian Representatives: Kipp Kelly, Ltd., Winnipeg. Agents in Principal Foreign Countries.

Sturtevant REG. U.S. PAT. OFF. **Vacuum** *Portable and Stationary* **Cleaners**


Only wooden boxes can stand the jolts and jars shipments receive en route.
Protect your merchandise! Thieves pass by the wooden box.
Good wooden boxes are weather-resisting ..protect merchandise from the elements.
Crash! Bang! Freight cars bump together. Good wooden boxes protect cargoes.
No matter where you ship . . . avoid disgruntled customers by using good wooden boxes.

FIVEFOLD PROTECTION*

with Wooden Boxes

YOUR shipments must be well packed to survive the thousand and one perils they face between the time they leave your shipping room and the time the customer receives them.

Packages get countless jolts en route. Perhaps they are exposed to rain . . . sleet . . . snow. Thieves may break them open . . . steal precious merchandise.

If the customer receives a damaged shipment, trouble begins . . . red tape unrolls . . . ill-will starts . . . sometimes costly litigation.

Clearly, it's a business asset for your merchandise to arrive in perfect condition. Wooden boxes . . . strong, sturdy, durable . . . will minimize damaged shipments.

Fivefold Protection* — good wooden boxes—assures the delivery of your merchandise in the best possible condition. Whether you ship by rail, water or truck, you will find Fivefold Protection* the safest, most economical way of packing.

The Wooden Box Bureau maintains a staff of packing and designing engineers to assist manufacturers with shipping-room problems. Their services are free and without obligation. If you are confronted with any packing or shipping troubles, they will be glad to help you.

Fill in and mail the attached coupon. It may mean thousands of dollars to you.

***FIVEFOLD PROTECTION**

Good Wooden Boxes safeguard your merchandise against:

1. **Rough Handling in Transit**
2. **Hidden Damage** (*crushed contents, torn labels, etc.*)
3. **Pilferage**
4. **Bad Weather**
5. **Disgruntled Customers**

Wood-Use It Nature Renews It

WOODEN BOX BUREAU
111 West Washington St., Dept. 2612
Chicago, Ill.

Gentlemen:

We manufacture_____and are interested in learning more about the advantages of Fivefold Protection.*

Wood Packing Pays

Name_____

Company_____

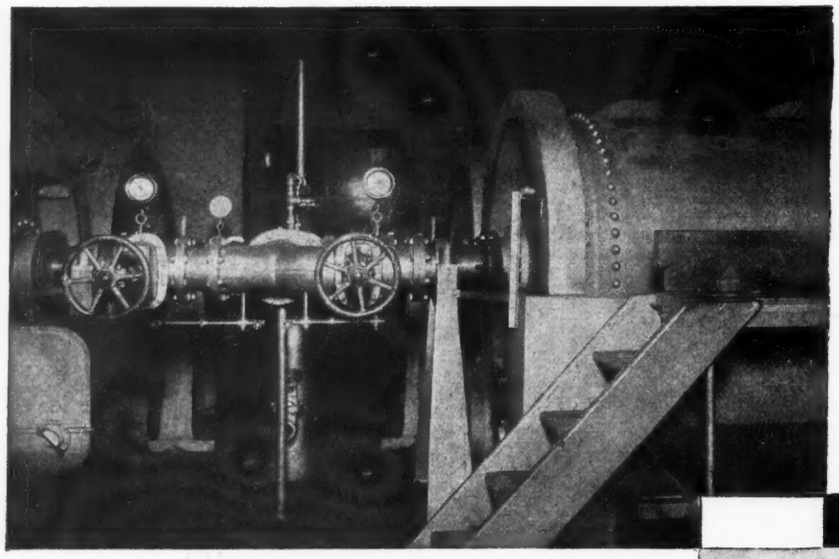
Street_____

City_____ State_____

WOODEN BOX BUREAU

of the National Association of Wooden Box Manufacturers and of the National Lumber Manufacturers Association • Chicago, Illinois

FIRST.. FOR THE 57 VARIETIES



FOUR STEAM COOKERS *of Allegheny Metal prepare Heinz Rice Flakes. Photo taken in H. J. Heinz Company Plant, Pittsburgh, Pa. Equipment fabricated by McAleenan Brothers Company, Pittsburgh, Penn.*

NOW . . .

FOR THE THOUSANDS WHO MAKE THE 57 . . .

Allegheny METAL

Allegheny Metal food machinery makes Heinz products . . . Allegheny Metal kitchen equipment prepares meals for thousands of employees

H. J. HEINZ COMPANY planned a huge recreation building. It was to entertain and feed the thousands who prepare the famous 57 varieties.

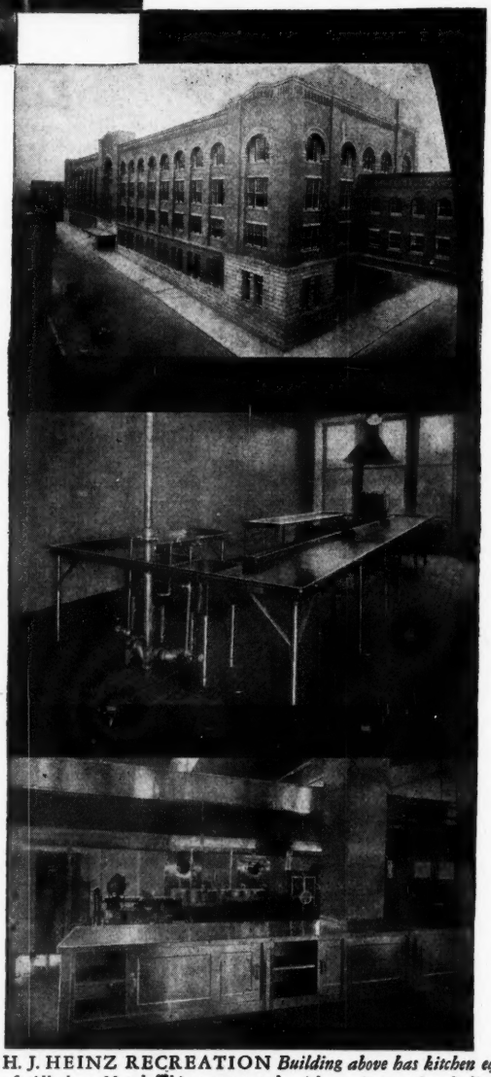
The best metal for kitchen equipment was sought. Experience in the plant itself pointed to Allegheny Metal.

But why—you wonder—did this alloy stand out?

Because Allegheny Metal is insoluble in practically all food combinations—even the most acid. Because it does not render food unfit for marketing by changing its taste or color. Because it offers lighter weight and greater strength.

For these reasons Allegheny Metal is successful in food manufacturing. For these reasons it was picked for all equipment in the kitchens of the new Heinz Recreation Building. This use by Heinz is their sincerest endorsement.

In your food manufacturing or kitchens, you can get these same qualities if you pick Allegheny Metal. Call on some of your friends who use it. Ask their opinion of it. Specify this alloy.

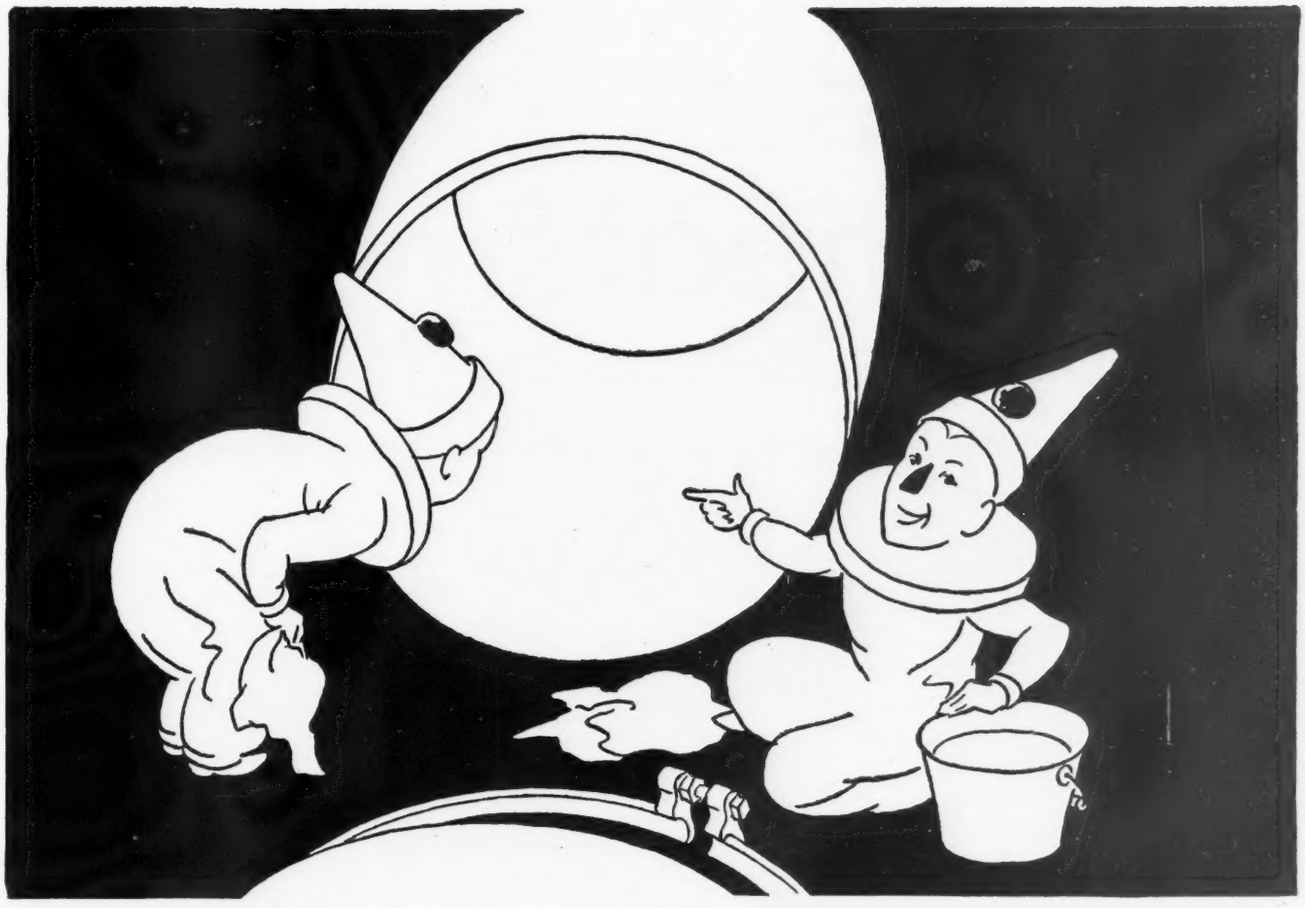


H. J. HEINZ RECREATION *Building above has kitchen equipment entirely of Allegheny Metal. This was opened with an international dinner November 8 Fabricated by Gloekler Co., Pittsburgh, Penn.*

ALLEGHENY METAL

Licensed by the Chemical Foundation Inc. under basic patents No. 1,316,817 and No. 1,339,378

ALLEGHENY STEEL COMPANY, Brackenridge, Pa. . . . *Offices:* New York, Buffalo, Chicago, Cleveland, Detroit, St. Louis, Milwaukee, Los Angeles. *Warehouse Stocks:* Joseph T. Ryerson & Son, Inc.—Chicago, Cleveland, Milwaukee, St. Louis, Cincinnati, Detroit, Buffalo, Boston, Jersey City, Philadelphia . . . *In Canada:* Samuel & Benjamin, Ltd., Toronto.



Easy to Clean

No other container can match Hackney Seamless Removable Head Steel Barrels for easy cleaning.

There's not a seam, rivet, crack or crevice where even the smallest particle of dirt or residue can become lodged.

For Hackney Seamless Barrels are drawn from one solid sheet of steel.

And the upper rim curls outwardly, making a full, unobstructed opening.

In addition, the famous patented Hackney head construction simplifies taking off and putting on the head to the mere tightening or loosening of a single bolt.

Leakage in or out is completely eliminated.

There are many other Hackney advantages that make for easier handling, more attractive appearance, longer life and lower shipping costs.

Write for complete information.

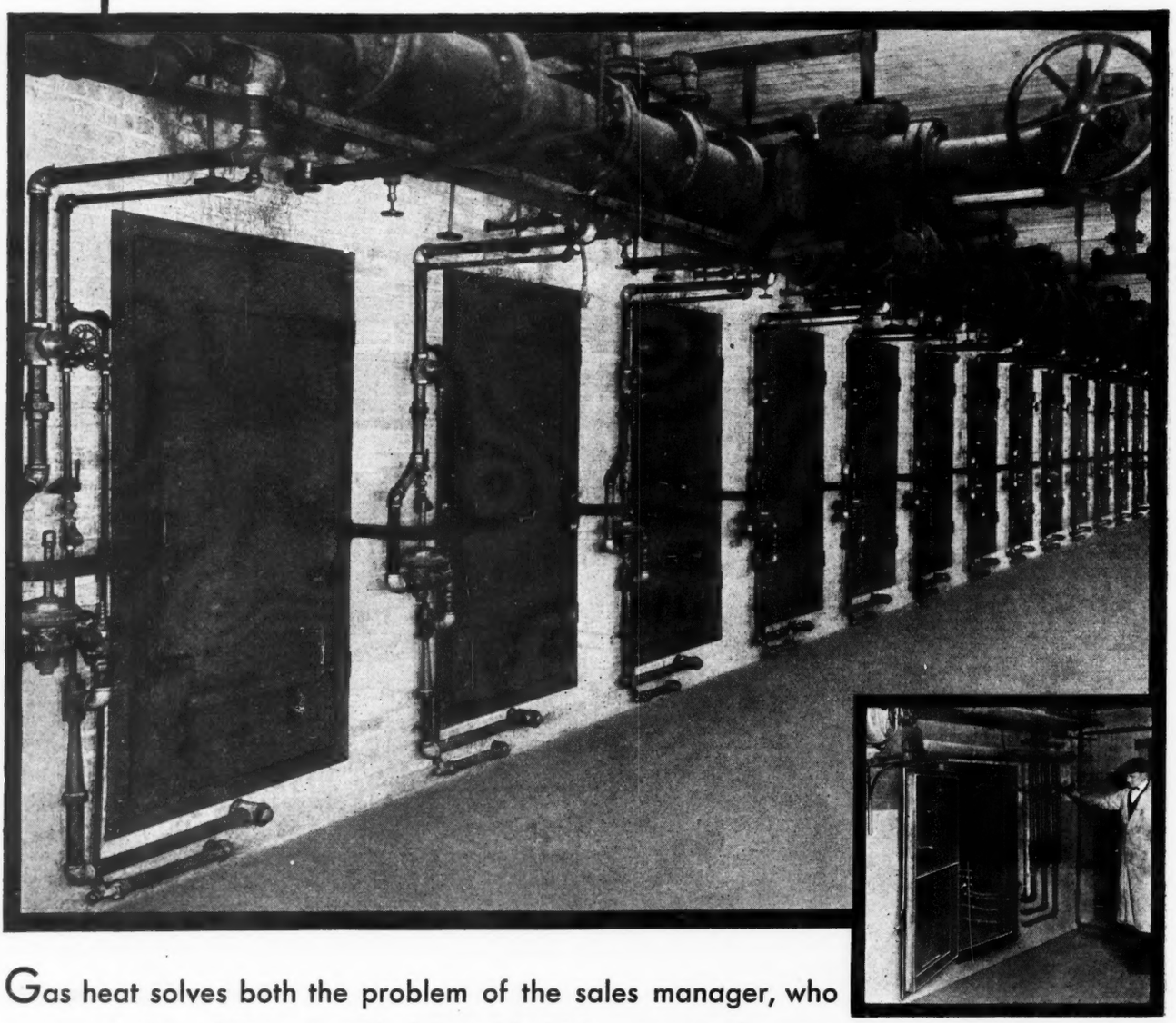
This is but one of the complete line of Hackney steel containers to better meet your shipping problems, shipping hazards—high costs

PRESSED STEEL TANK COMPANY

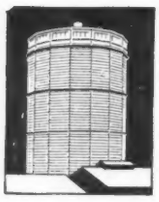
1173 Continental Bank Bldg. . . . . Chicago
1349 Vanderbilt Concourse Bldg. . New York City
5771 Greenfield Avenue . . . . Milwaukee, Wis.
477 Roosevelt Building . . . . . Los Angeles

Hackney
MILWAUKEE

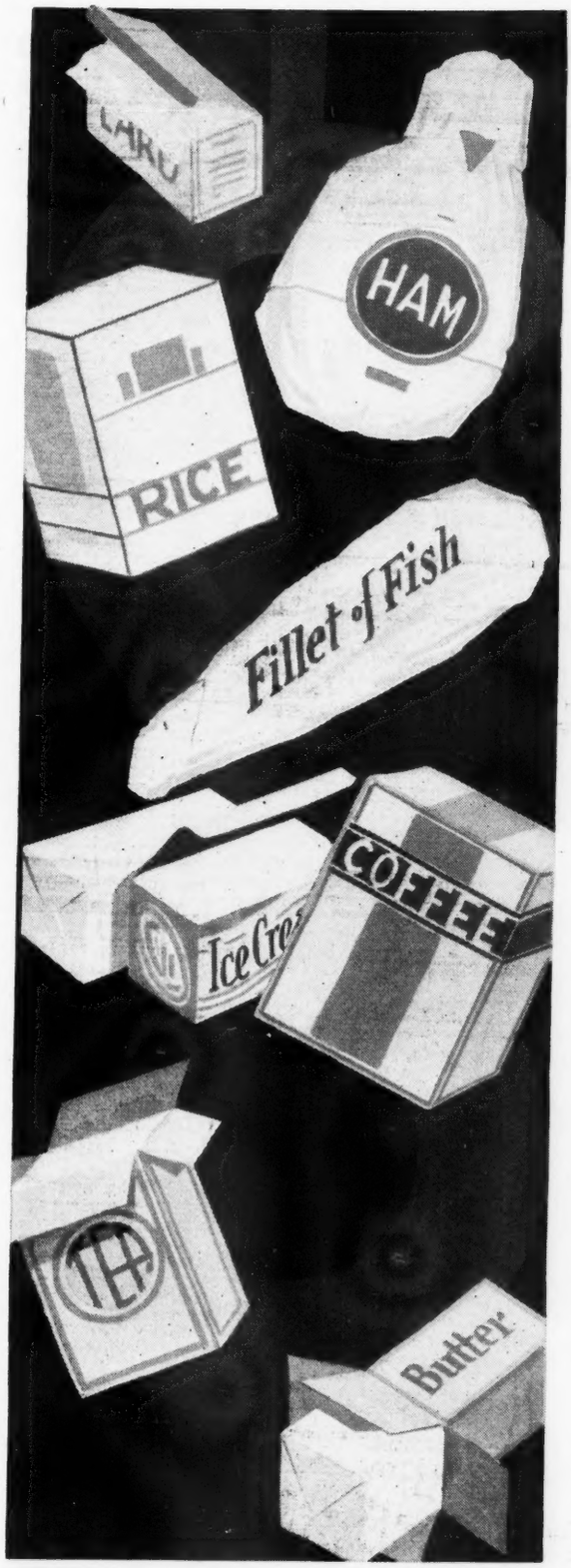
gas heat solves meat smoking problems:



Gas heat solves both the problem of the sales manager, who must meet the public taste with delectable hickory-smoked meats, and of the engineer, who must contrive to handle the production economically. The use of gas heat eliminates the fuel problem, and insures uniformity of quality. Your copy of the new book "GAS HEAT" will tell you what others are doing in this field.



AMERICAN GAS ASSOCIATION
420 Lexington Avenue, New York



Beyond Price Competition

IT IS generally known that good packaging is not only valuable to protect foods and prevent waste -- it also results in the "Consumer identity" which is a big help to keep prices at a profit making level.

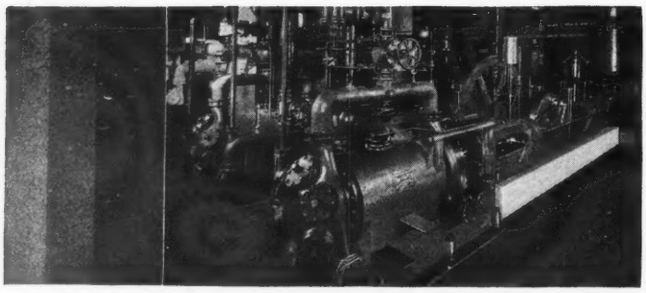
This important factor of price-maintenance alone, would make packaging a necessity but there are other vital reasons. There are new conditions and shifting markets -- changes in types of cartons and in production methods -- all calling for special wrappers to fit the varying products, climates and shipping conditions.

This company is proud to be consulted by so many industrial leaders who look to its skilled corps of Research Engineers for the exact protection of their products; foods wet and dry, greasy or fresh -- to be shipped to any climate, a mile away or across the world.

Whatever your particular problems are will you let us talk them over? There is not the slightest obligation entailed.

KALAMAZOO
VEGETABLE PARCHMENT CO.
KALAMAZOO -- MICHIGAN
MANUFACTURING WORLD-FAMOUS FOOD-PROTECTION PAPERS

KVP
PROTECTION PAPERS



THE USE OF "BOOSTER" COMPRESSORS

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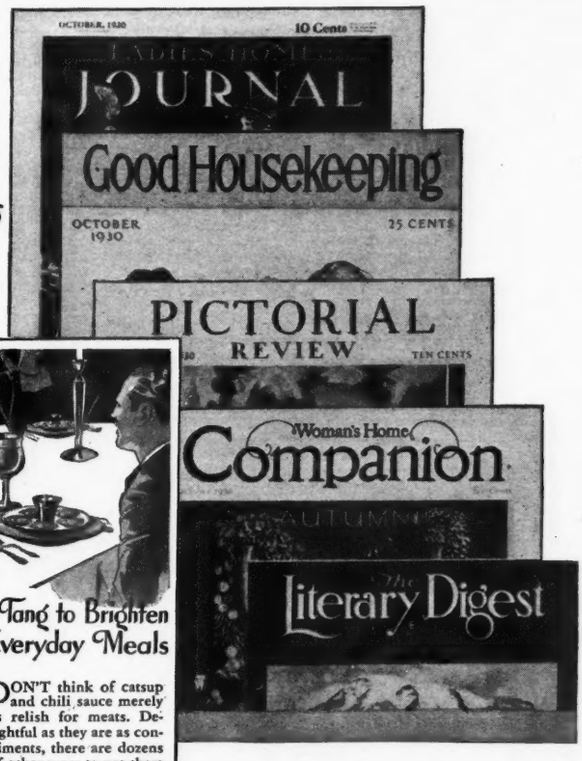

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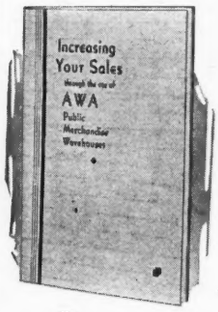

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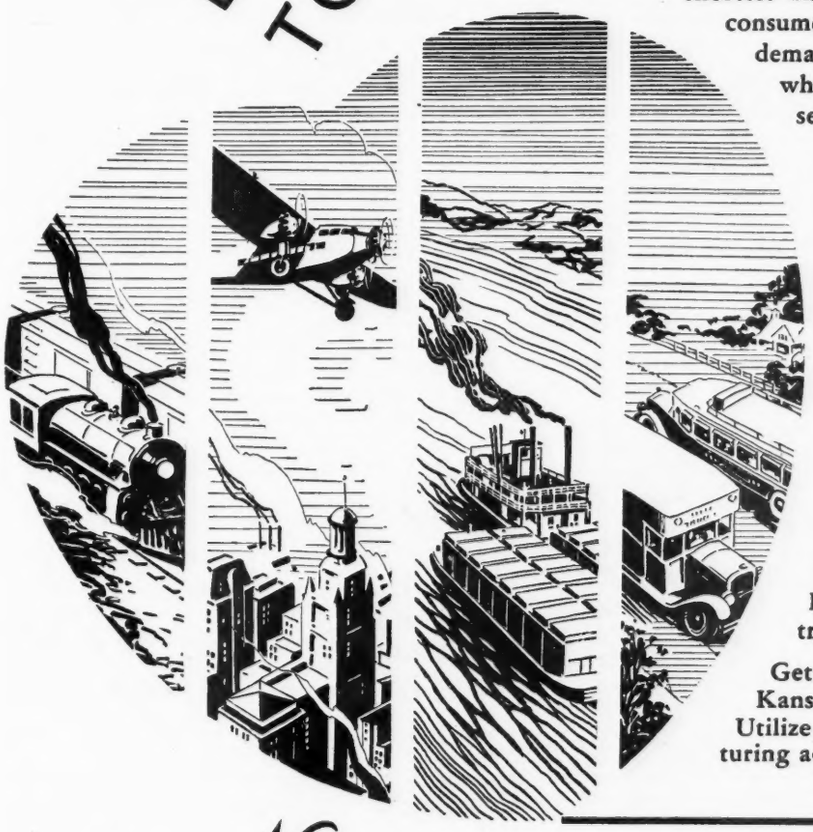

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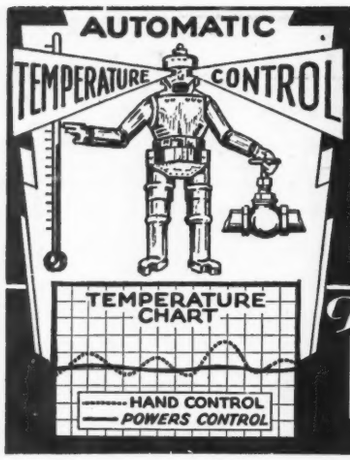

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• THE January Annual Review and Progress Number of FOOD INDUSTRIES will be a special theme issue devoted to "Research in the Food Industries."

Not *research* in the sense of describing pretty laboratories and the excellence of their personnel. But *research* as a part of that broad function known as "development." Research is management's most powerful tool in developing ideas and then turning these ideas into dollars.

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On the one side there will be a series of contributed articles which will discuss the value of research to the food manufacturer. More specifically—the relation of research to product development and production control; raw material research and market research. Articles on research control deal with the other side.

In addition, there will be a review of the progress that has been made in the production and distribution of frozen foods. Also, an eight-page insert on special stock in which, by chart and table, the relation of 1930 to preceding years, in production, distribution and consumption will be set forth.

In fact, we confidently feel that this January issue will be the finest special theme issue we have ever published.

» » » » Every issue of FOOD INDUSTRIES published to date has been over-subscribed within a few days after its appearance, and we still have on hand orders for thousands of copies which we cannot supply.

So, if you wish to be sure of receiving a copy of this January issue, send your order in NOW. The coupon is for your convenience.

Incidentally, a year's subscription to FOOD INDUSTRIES costs only $2; or two years for $3.

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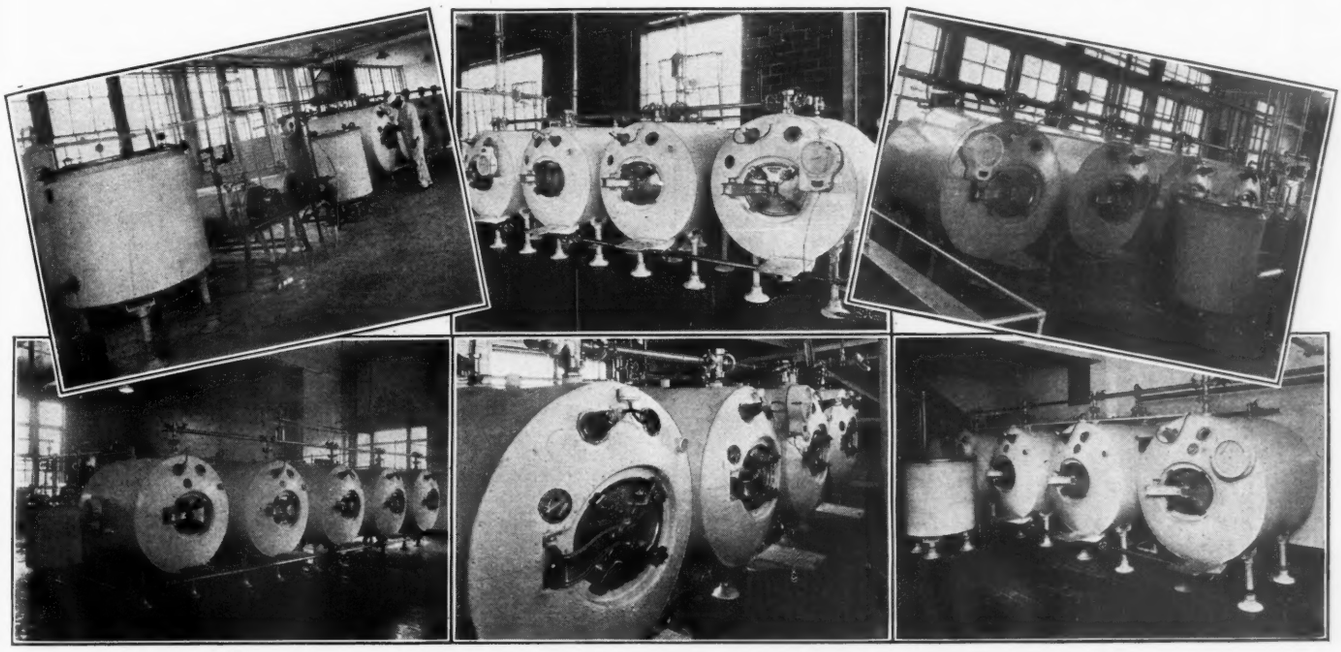

Some of the more recent Pfaudler Automatic Milk Pasteurizing installations:

Upper left: Clover-Leaf Harris Dairy in Salt Lake City, Utah, with a capacity of 10,000 pounds of milk per hour.

Upper center: Pfaudler Holding System in the Ira Wilson & Son plant at Detroit, Michigan. Capacity 8,000 pounds per hour.

Upper right: The Jersey Creamery Co. plant in Detroit, Michigan. Also with a capacity of 8,000 pounds per hour.

Lower left: A 15,000 pounds of milk per hour holding system in the Borden's Farm Products Co., in Newark, N. J.

Lower center: The United Dairy Co. uses a Pfaudler holding system in its Detroit plant. Capacity 8,000 pounds per hour.

Lower right: The Reid Ice Cream Co. of Brooklyn, N. Y., has a Pfaudler Automatic Holder with a capacity of 15,000 pounds of milk per hour.

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✦ TO ADVERTISERS ✦

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